OVERSEAS EDITION
OCTOBER 1954

McGRAW-HILL DIGEST

INTERNATIONAL BUSINESS AND INDUSTRY

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PAPER DEMAND soars everywhere. It's an index to the world's growth in literacy and industrialization p15

GLASS-PLASTICS, compression molded in big pieces, has a bright new future in this plant p22

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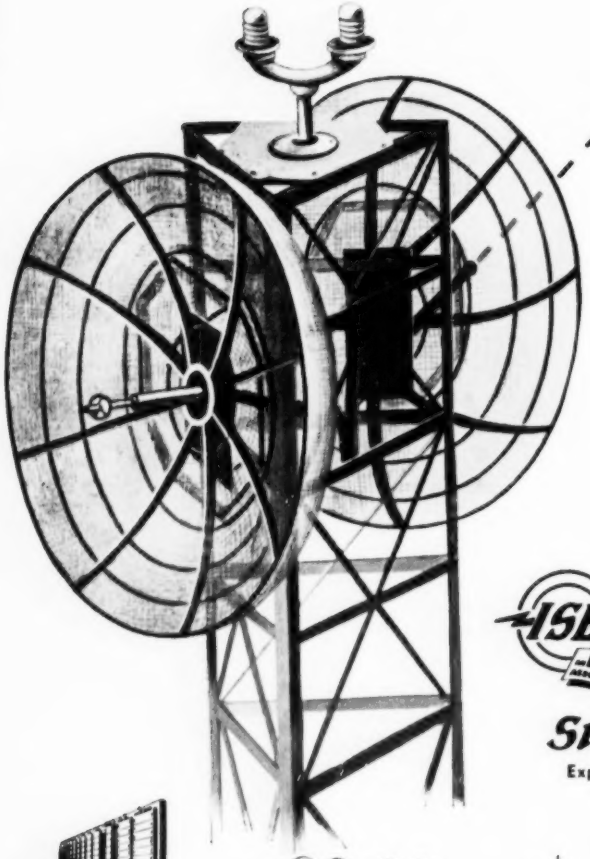
...the communication system of the future for LATIN AMERICA



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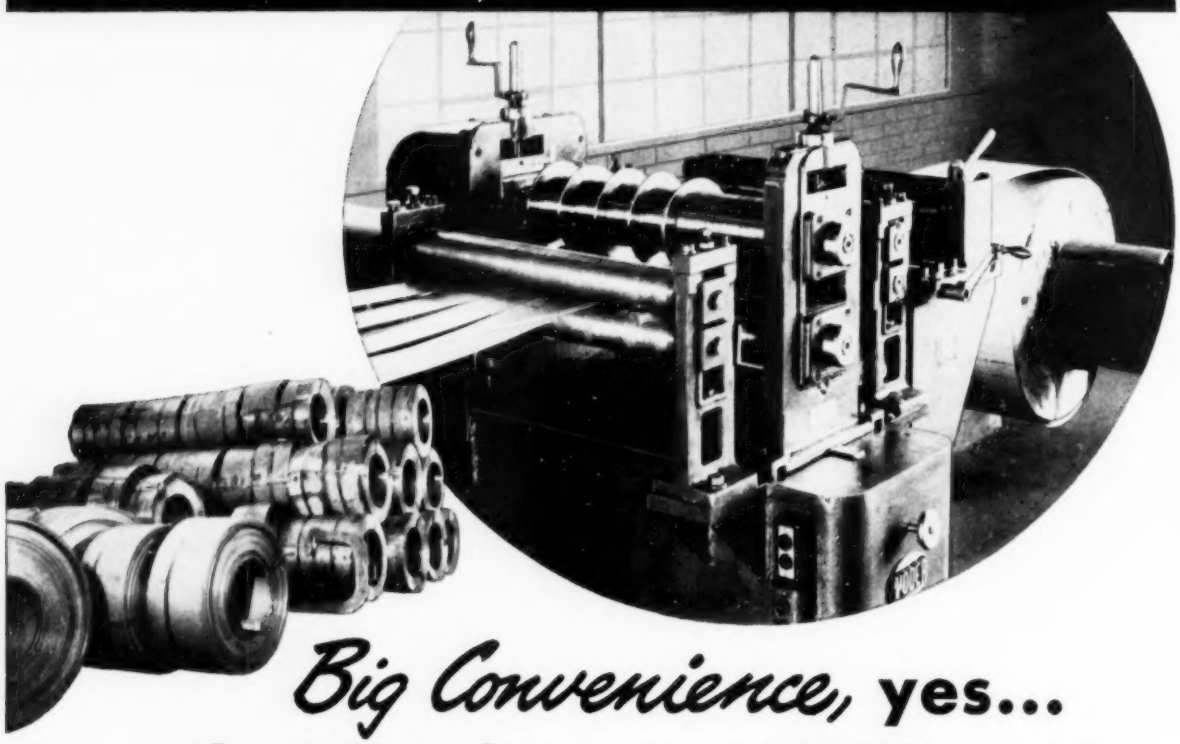

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McGRAW-HILL DIGEST

. . . the best from 44 business magazines—see p56

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October 1954 | McGRAW-HILL DIGEST | Vol. 9—No. 10

Member—Audit Bureau of Circulations

Published monthly by McGraw-Hill International Corporation for circulation in all countries of the world except the United States and Canada. *Publication office:* 99-129 North Broadway, Albany 1, N. Y., U. S. A. *Executive and editorial offices:* 330 West 42nd St., New York 36, N. Y., U. S. A. Donald C. McGraw, Chairman of the Board; Willard T. Chevalier, President; Eugene F. Warner, Senior Vice-President; Joseph A. Gerardi, Treasurer; John J. Cooke, Secretary; J. C. Stark, Vice-President, Publications Division; K. Presbrey Bliss, Vice-President and Director of Advertising; J. E. Blackburn, Jr., Director of Circulation.

Subscriptions may be ordered through Director of Circulation, through local book dealer, or McGraw-Hill Publishing Co., Ltd., McGraw-Hill House, 95 Farringdon St., London, E. C. 4 (British only). Subscription rates: $5 for 1 year, $8 for 2 years, or $10 for 3 years; single copy 50¢ (U.S. currency). Entered as second-class matter January 1, 1953, at the post office at Albany, N. Y. under the Act of March 3, 1879.

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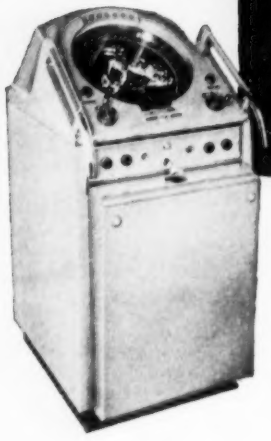

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"Your machines pay for themselves," Mr. J. A. Routledge (center), Chief Accountant of the Union Whaling Co., tells Mr. Posselt, the Burroughs man (left). *Another case where Burroughs means better business.*

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Modern machines that lower the cost of metals, minerals

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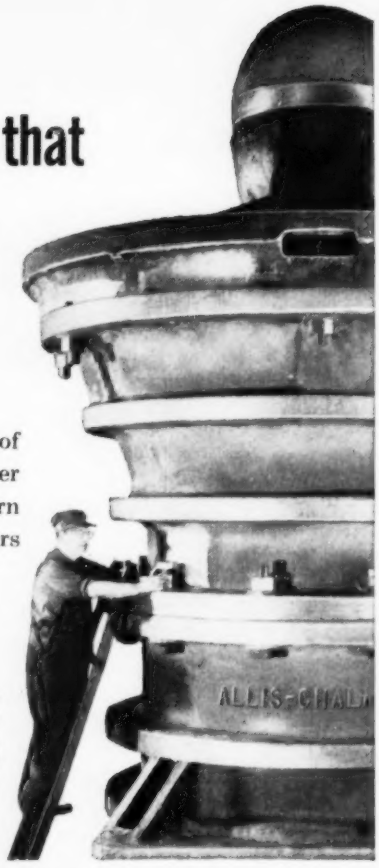
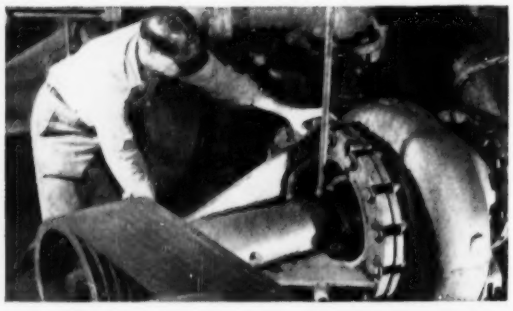


GYRATORY CRUSHER

These crushers break up huge chunks of ore and rock as easily as you might crush peanut shells. Large crushers can process thousands of tons of ore a day.



SOLIDS HANDLING PUMP

These pumps move slurries—mixtures of solids and liquids such as coal and water or sand and water. Some of these pumps are lined with rubber which far outwears metal when handling abrasive material.

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BUSINESS TRENDS

U.S. BUSINESS enters 1954's last quarter in an optimistic mood. Several steps by the Eisenhower Administration and by Congress (reflecting Administration policies) have added strength to the economy. The chief ones:

Spending: To spur an indicated final-quarter upturn, the Administration is giving business a $500-million "nudge." This consists of a speed-up of outlays at the start of the 1954-55 fiscal year—on highways, airports, shipbuilding, etc.—over and above original planning. It will be followed by cutbacks later.

Taxes: Although the new tax law pours millions into people's pockets through many minor liberalizations, its main aim is to boost business. The chief tool—new rules permitting accelerated depreciation of new plant and equipment during its early life. The Administration expects that resultant boosting of depreciation reserves will have a chain reaction on plant expansion—big enough to offset hoped-for declines in Federal spending in the next 10 years and to keep the nation growing without resort to pump priming.

Housing: To this major economy booster—now turning out homes at the rate of 1.2-million yearly, highest since Jan 1951—the 1954 Housing Act gives a big new stimulus by easing terms for government-insured mortgages. For instance, down payment on a $12,000 house is cut from $2,400 to $1,200; maturities run to 30 years.

Confidence in the business outlook is now widespread throughout the nation. Key pointers: (1) latest surveys of consumer attitudes show a higher buying trend; (2) the stock market, traditional index of the economy, has continued strong.

AMID BLAZING COMPETITION for a buyers' market, the U.S. automobile industry is now engaged in its first full-scale change-over to new models since the war. At least ten makes will have all-new bodies featuring more rakish lines (a trend reflecting European design) and more glass area. Other major developments:

- **The V-8 engine** is almost completely ousting the straight-8 and 6. Seven 1955 models will sprout their first V-8's (a few makers will retain 6's as alternatives). V-8's will accentuate the shift toward higher compression and horsepower.
- **Tubeless tires** and "wrap-around" windshields will be standard equipment on most models.

Incidentally, automobile plant shutdowns for new-model retooling, plus summer doldrums, helped depress the steel industry's operating rate to only 64% of capacity (95% of 1947–49 output). But resumption of full-scale output by the automakers, steel's best customers, is expected to push the rate up to 70% and more.

THE ATOM AGE WAS BORN in the U.S. industrial complex with the enactment of the new Atomic Energy law. For the first time, U.S. industry can now:

- **Operate its own nuclear power plants** and large atom reactors under license from the Atomic Energy Commission.
- **Count on patenting** the products of its own research (although for the first 5 years any patents of "primary importance" must be shared). This is expected to unleash immense research activities, with incalculable results.

But no atomic revolution overnight is expected by anyone. The private atomic-energy industry will develop slowly. It will be strictly regulated (atomic fuels will be leased from the government). But here are some portentous signs:

Power: Two impressive major industrial groups are already in the research field. One, the "Dow-Detroit Edison group," includes 26 companies under leadership of Dow Chemical and Detroit Edison. The other, the "Chicago group," includes American Gas & Electric, Bechtel, Commonwealth Edison, Pacific Gas & Electric, and Union Electric. Both hope to start building competitive nuclear power plants by 1956 or 1957.

Isotopes: Many big companies will want small reactors of their own. One use would be making isotopes. Already 850 firms use these in business.

Trade: Nuclear specialist firms foresee substantial foreign demand for atomic equipment. One has already received inquiries from Italy, Brazil, Sweden, and Belgium.

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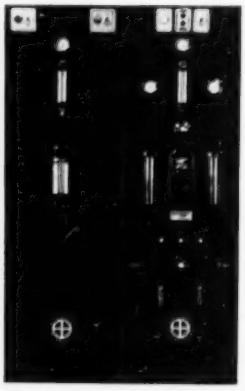

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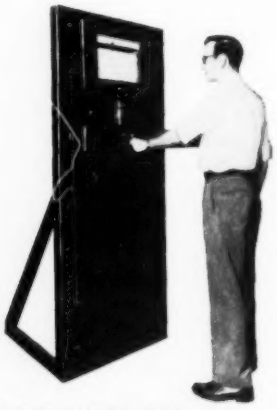

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INTERNATIONAL TRENDS

WASHINGTON—Trade liberalization remains the keystone of U.S. foreign economic policies—despite the recent boost in watch import duties (McG-H Digest, Sept '54, p9). This was demonstrated anew by President Eisenhower's rejection of demands, backed by 32 Senators, for higher lead-zinc tariffs.

Like the watch makers, the miners sought protection as a defense industry. But the Administration ruled that a tariff boost wouldn't help them, while it would undermine world-trade freedom trends and, in particular, embitter Canada, Mexico, and other producing countries.

The powerfully-backed miners' demands nevertheless posed a dilemma for Eisenhower, especially with Congressional elections due next month. He solved it by . . .

- **Doubling stockpile purchases** of domestic metal for the next 9 months;
- **Setting up a "supplemental" stockpile** for which foreign lead-zinc will be bought through barter of surplus farm goods. This will help keep some foreign metal off the U.S. market.

The U.S. industry is far from happy, however. It considers the new stockpile policy only temporary and plans to push for higher tariffs again next year, when extension of the Reciprocal Trade Act comes up for another vote.

PARIS—Does Russia want trade? The answer should soon be known, following the broad relaxation of controls over "strategic" exports to the Soviet European bloc by 16 Western nations.

Relaxation of controls does not change the basic goal—to ban exports of militarily useful goods to the Soviet bloc. In fact, measures to tighten enforcement will be stepped up.

But it does mean that many items previously banned but now released as non-strategic can be shipped to Red Europe. Among them: Certain machine tools, generators, tractors, ships, chemicals, etc. One immediate result was to permit exports from Britain of $14-million additional goods to Russia (although $42-million of other orders, largely steel-rolling equipment, remained under ban).

But there is plenty of skepticism among international traders that any really big expansion of East-West trade is likely. Practically all the reasons lie in Russia itself.

- **The Soviet Union's** fundamental economic aim is self-sufficiency, including forced industrialization. This leaves little to spare for exports—the wherewithal for buying imports.
- **Russia's many publicized trade pacts** with Western countries are not binding commitments but merely authorizations to do this or that much business if details can be agreed on. Experience shows they often produce little (Greece, for instance, found its 1953 trade pact with Russia produced practically nothing).
- **Although she has increased consumer imports** slightly, the only imports Russia is really interested in are those that promote her industrialization (many of these are strategic). Example: Moscow stalled a recently negotiated Danish-Soviet trade pact when Denmark refused to ship goods banned by the West, namely tankers.

RIO DE JANEIRO—The U. S. Administration, it is revealed here, is drafting a new economic aid program for Latin America, to be presented at the Inter-American Conference to be held in Rio next month. Its main aims:

- **To meet complaints** that the region has been neglected in favor of Europe and the Far East.
- **To bolster** Latin America's economic strength against Communist inroads, as in Guatemala.

The new program's field will be technical aid. Thus, although its contemplated grants—about $50-million—are small, its long-range potential is high. Another key feature of the plan is a big expansion of Export-Import Bank lending.

The change in Brazil's Administration, following President Getulio Vargas' death, is not expected to affect the plans. Both U.S. government and business have confidence in Brazil's future.

There's some hope, in fact, that Brazil's new course may prove economically beneficial. For instance, full credit is given to former Finance Minister Aranha's vigorous if unorthodox efforts to stem inflation and stabilize the country's economy.

But it's also realized that the "Aranha Plan," with its maze of currency regulations and devices, brought irritations and frustrations to many foreigners. So did the former Administration's coffee policies that set high prices above competitiveness, both antagonizing foreign traders and playing into the hands of Brazil's rivals.

One major hope: The new Administration will make an early, realistic devaluation of the cruzeiro.

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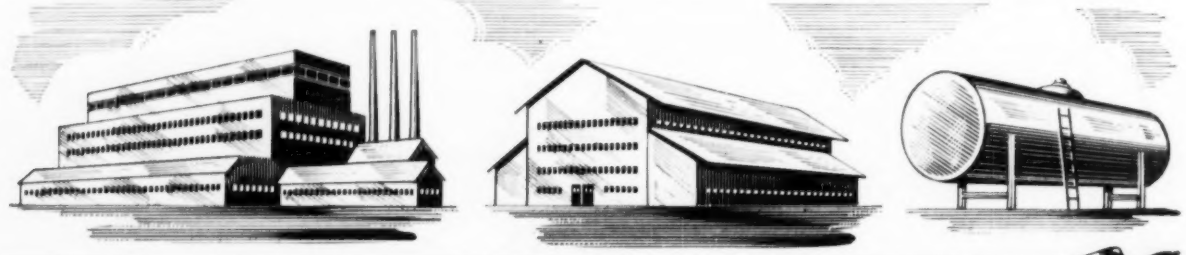

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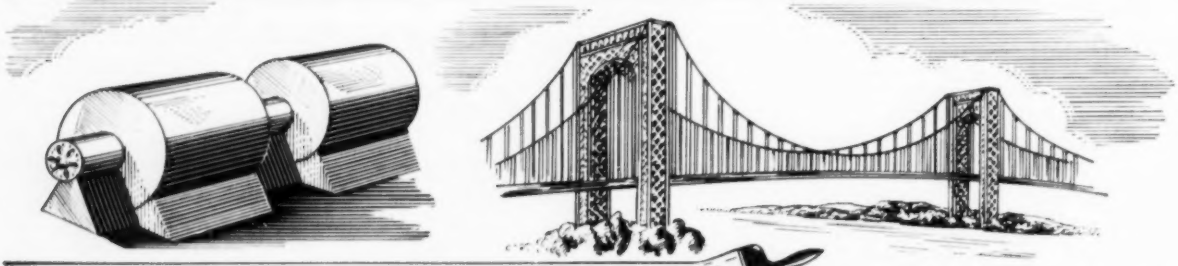

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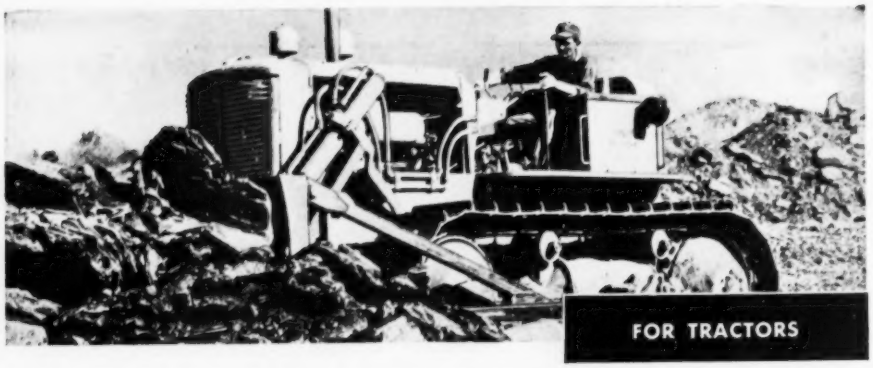

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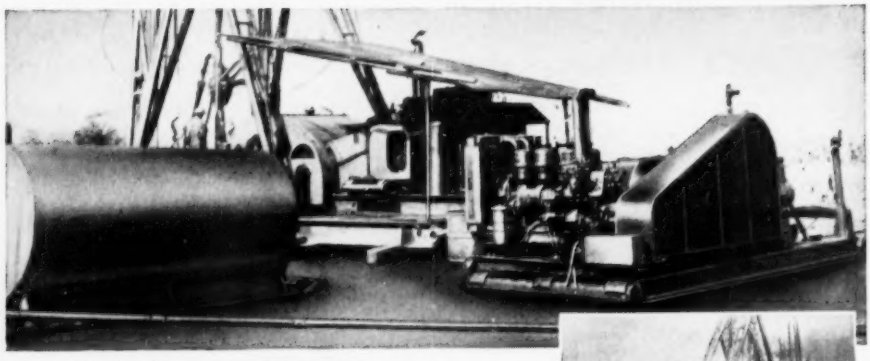

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OCTOBER 1954
VOLUME 9 • NUMBER 10

McGRAW-HILL
DIGEST

Abadan refinery went on stream this month after 3 years of crises and lost production

Iranian Oil Flows Again

- Though nationalized, oil profits will be split 50-50
- Producing and marketing patterns stay unchanged
- New U. S. ideas appear.—An original Digest article

WASHINGTON—Early in October, oil began to flow out of Iran again. The event marked the end of a 3-year period that saw the country swept by riots, assassination, revolution, and counter - revolution. Throughout the period, Iran's economy suffered from the loss of $600-million of oil revenue.

It was an expensive 3 years also for Anglo-Iranian Oil Co. Ltd. The company's profits were halved and its investment load doubled. U.S. taxpayers felt the effects of the Iranian oil crisis. They had to provide the many millions of dollars that were poured into Iran to keep its economy going.

On August 31, the Iranian parliament passed into law the agreements reached between the Iranian government and an eight-company international oil consortium. The agreements provide for:

- The terms under which the consortium will carry out large-scale producing and refining operations in Iran.
- Payments of $70-million as compensation to Anglo-Iranian Oil Co., by the Iranian government.

Iran will get 50% of the net profits after costs on the sale of oil. Payment will be in sterling, 40% of which will be convertible to dollars. The rights to the consortium run for 25 years with another 15 years in extensions.

The immediate effect of the settlement—and one important to you—will be to stabilize the world oil market for years to come. The agreement finally worked out represented a resounding victory for the big international oil companies, the fifty-fifty profit sharing formula, and the status quo in world oil production and marketing. In realistic operating terms, nationalization of Iranian oil has changed nothing.

In the Middle East, the return of Iranian oil into the market will mean holding down the planned rate of expansion of crude production in the other Middle Eastern oil-producing countries. But expansion of Eastern Hemisphere demand for oil at the current rate of 300 barrels per day per year should make it possible to fit Iranian oil into the market without any drastic reduction of present production elsewhere.

Present plans call for producing about 15-million tons of crude in 1955, 23-million tons in 1956, 30-million tons in 1957. Production should level off thereafter at between 35- and 40-million tons. That compares to annual rate of about 40-million tons at the time of nationalization. The Abadan refinery will handle a run-through of 250- to 300-thousand barrels per day as compared to 550-thousand barrels before nationalization.

Net profits to Iran probably will be $60- to $70-million in the first

". . . A model for closer government-business cooperation abroad"

year, $110- to $130-million in the second, $175- to $190-million in 1957, and up to $250-million at full production. In the last year before nationalization, the Iranians netted about $45-million.

Direct immediate effects outside the Middle East will be negligible—despite the fact that Iranian oil is coming back onto a glutted world market. Iranian production will be absorbed by cutting back the planned rate of expansion of other Middle Eastern producers, and the area's share of the total world market will remain the same. There will be no pressure on Venezuela or other Latin American countries to slow down on prospecting and drilling, no extra pressure on the U.S. Congress from U.S. independent producers to raise tariffs and cut imports.

All adjustments will be made within the Middle East. This fits both the major oil companies' policy of seeking to stabilize the world market and U.S. government policy of trying to give Latin America a fair deal economically. Neither the government nor the major oil companies want to increase pressure for higher U.S. tariffs from independents by raising oil imports into the U.S. from the Middle East producing areas.

Beyond these short-run repercussions on the oil market itself, there are some general implications in the Iranian settlement that may affect the international investment climate.

For the first time in history, the U.S. government drafted the services of private business on a major scale to achieve political and strategic ends. In this setting a new figure emerged onto the international scene. Herbert Hoover, Jr., son of the former U.S. President and now Under Secretary of State, was picked by Washington to try to bring the British and Iranians together in a temporary settlement. Mr. Hoover made 14 trips to London, 6 to Teheran. One of his first jobs was to restore diplomatic relations. That done, it became evident that it would take as long to get a temporary settlement as it would a permanent one. So Mr. Hoover went after a permanent settlement.

He decided Anglo-Iranian would need help from other oil companies. It took 6 months to bring together company representatives and Iranian officials. Mr. Hoover's final formula joined five American companies with Anglo-Iranian and Dutch and French companies.

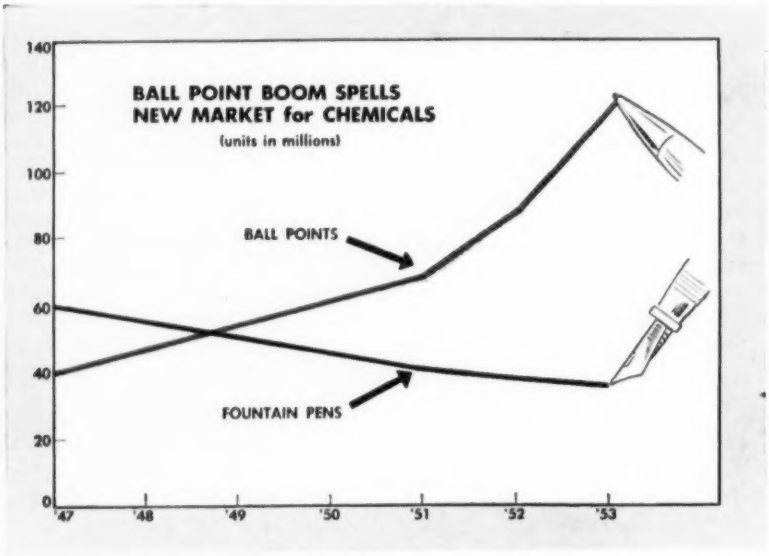
It was his persuasive power and the insistence of the U.S. that an Iranian settlement was essential to close Russia's door to the oil fields, not strictly profit-making considerations, that induced the big five of American oil to enter the consortium.

This might well set a precedent for other industries in other countries. U.S. administration officials are studying the history of the Iran settlement to see whether it provides a model for closer government-business cooperation abroad. The big problem in meeting the Communist threat around the world, as they see it, is to put American productive skills to work alleviating poverty.

This cannot be done efficiently under government technical assistance programs. They lack the trained personnel, the technical knowledge, the capital, and the continuity to give a steady transfusion of capital and skill to underdeveloped countries.

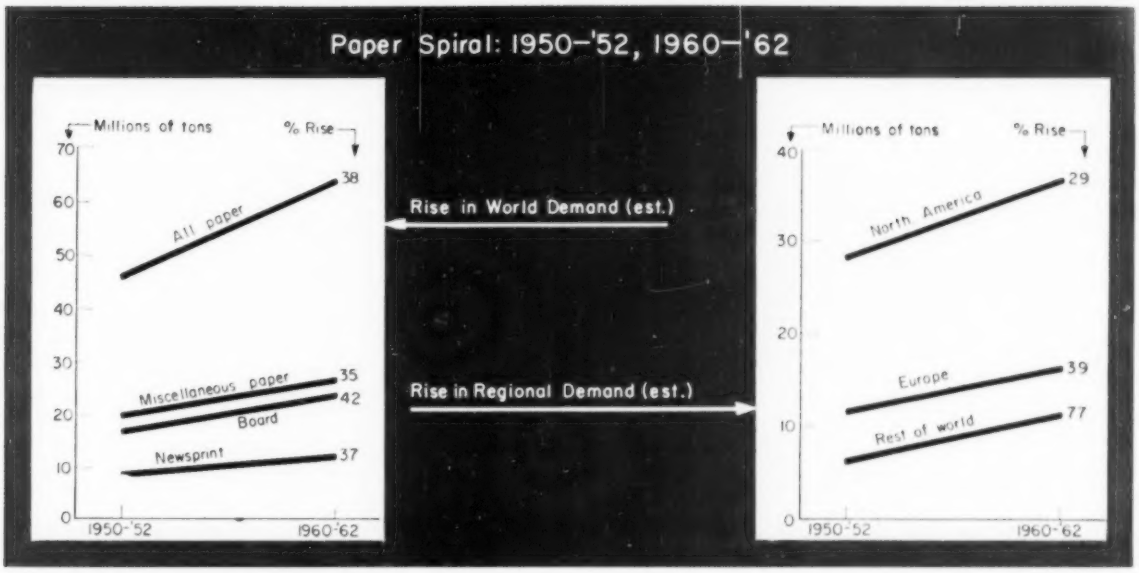
There are lessons in the Iranian settlement for underdeveloped countries as well. It shows how difficult it is for an underdeveloped country to run a major export industry outside the framework of the established world production and marketing channels.

Even before the end of the Korean boom, it was clear that Iranian oil wasn't needed. It was just as clear that the big oil companies were not going to jeopardize their positions in other countries by giving Iran a special deal. Nor were they going to break ranks in the hopes of making a quick profit at Anglo-Iranian's expense. That left Iran the choice of going to the Russians or accepting the oil-companies' basic terms.



Ball Points Up, Fountain Pens Down . . .

. . . tell a vital story to chemical manufacturers—where to look for an important new market. Paste-ink business for new ball-point pens and refills amounts to 300,000 lb. per year for a $1.5-million value. And it's going higher: estimated ball-point sales this year are over 200-million. Oil-based paste inks use oleic acid, mineral or castor oil, basic dyes; newer alcohol-based quick-drying inks use light-fast acid dyes. Resins also are needed: maleic-modified or fumeric-modified rosin condensates dissolved in lower glycols as solvents.—Chem Wk, June 26, p30



Paper: Most Wanted Commodity

PAPER EXPERTS from all over the world are gathering in Buenos Aires this month to tackle an urgent question: paper shortage in Latin America.

They will meet from Oct 22 to Nov 2 under the sponsorship of the Argentine government and three United Nations' groups—the Economic Commission for Latin America, the Food and Agriculture Organization (FAO), and the Technical Assistance Administration. Besides technicians from Latin America, paper authorities from many other countries, including the U.S., Canada, Britain, Australia, Sweden, Germany, and France, will attend or send data.

The problem before the conference is this: Because of accelerating literacy and industrialization, demand for paper and paper products in Latin America is far outracing supplies. Unless decisive steps are taken to expand pulp- and paper-making there, the region may face a paper crisis a few years hence that could seriously hamper its progress.

The paper plight of Latin America is but part of a world-wide problem in underdeveloped areas. Asia and Africa are in similar straits. All started late in the race for what is probably the world's most wanted commodity. This may be seen from a glance at the global paper picture:

- North America and Europe, with 24% of the world's population, produce 90% and consume 87% of the world's paper and paperboard.
- Latin America, the Near, Middle and Far East, and Africa, with 68% of the world's population, produce 5% and consume less than 8% of its paper and board.
- The 575-million people of North America, Europe, and Oceania consume an average 76 kg. of paper each annually. The 1,600-millions of Latin America, the East, and Africa consume but 2.1 kg. each.

This imbalance in world-wide paper economics stems, of course, from the lopsided pattern of world-wide development. The key to paper-making, history shows, is industrialization, booster of living standards and of appetites for all types of paper—newsprint, magazine, book, writing, wrapping, packaging, and building. Thus North America and Europe have virtually monopolized the industry.

But now the underdeveloped regions are waking up, both culturally and industrially. Ahead of them today lies a grand vista of economic expansion. And in response to this historic shift, the paper pendulum has begun to swing—if ever so slightly—in a reverse direction.

For instance, delegates at Buenos Aires will have as their chief working paper a "World Survey of Pulp and Paper Resources and Prospects" just completed by FAO. It forecasts a rise in world paper demand from 46.9-million tons to 64.7-million between 1950-52 and 1960-62 (chart, above), a gain of 38%.

Of this gain, the biggest absolute increase—12.8-million tons, up 32%—will still be in North America and Europe. But the biggest relative rise—5-million tons, up 77%—

Editor's Note:
As the paper industry affects all countries' progress so significantly, the DIGEST reports to you here the world-wide demand and supply situation—and their outlook. Hearty cooperation from the United Nations and fifteen governments with the DIGEST staff, both in the U. S. and overseas, made this report possible.

"One real solution . . . to expand their own paper industries."

will be in the world's deficit areas. And this trend will grow.

But demand and its fulfillment are not synonymous. The trouble is that the deficit regions' pulp- and paper-making industries, as at present constituted and projected, cannot possibly meet the indicated needs. After allowing for expansions now planned, their estimated paper deficit by 1960-62 would be something like 1.8-million tons annually. And nearly half of this would be newsprint—vital in the world-wide drive to lower illiteracy.

Nor can these areas expect to make up the gap with imports from the great producing centers. One reason for this is that North America and Europe face immense demand increases of their own; also, their output is traditionally keyed to local markets, with little to spare for export. And even if large exports were available, few underdeveloped areas have the foreign exchange to pay for them.

Therefore there is only one real long-term solution—to expand their own paper industries.

This is the problem, in its Latin American context, that faces the men at Buenos Aires. But businessmen and international economists are also tackling it on a world-wide basis.

Two years ago in Rome, FAO staged a world conference to promote the use in paper-poor areas of new raw materials and processes for paper making. And in the past 2 years it has sent pulp and paper teams to 26 countries, including 12 in Latin America, to explore paper-making possibilities on the spot.

Can the shortage problem be averted? It depends largely on resources, processes, and costs.

• **Resources**—The North American and European paper industries have hitherto depended for raw material almost entirely on coniferous softwoods—ideal for pulping and processing. These are still the industries' greatest standby, although use of temperate hardwoods (such as poplar, birch, beech, and maple) is increasing.

The rest of the world has only minor coniferous resources (the single important exception is Russia, whose coniferous forests, the world's largest, are apparently being tapped chiefly for construction and play little or no part in world paper economics).

But other regions have immense resources of non-coniferous fibrous materials available for pulping. They include bamboo, bagasse (sugar-cane residue), straw and certain grasses, also limitless forests of mixed tropical hardwoods that have never been tapped at all. Here the problem has been how to process these materials into paper.

• **Processes**—Fortunately, several processes, using chemical or chemical-mechanical means, have recently been developed for pulping non-coniferous materials. The most important is the so-called sulfate process, in which the raw material is "cooked" in a mixture of caustic soda and sodium sulfide.

Highly flexible, the sulfate process can be used to process virtually all fibrous materials, including temperate hardwoods and vegetable wastes. In French West Africa it has been used on a small scale to process mixed tropical hardwoods into wrapping paper. One hope is that it can eventually be extended to tropical hardwoods generally.

• **Costs**—Building paper industries is expensive. A pulp and paper mill with a 75,000-ton annual newsprint capacity may cost $30-million. Several years must elapse between the planning and production stages. But excellent business prospects await capital invested under suitable conditions—such as ample accessible raw materials plus availability at reasonable cost of water, power, chemicals, communications.

Because of the large sums involved, governments and international groups can and often do help. For instance, the World Bank has lent $20-million to a Chilean firm to help start a new pulp and paper mill. Similarly, the U.S. Export-Import Bank has lent $16-million to New Zealand interests for pulp- and paper-making expansion.

These, then, are the highlights of world paper making. Now let us look at key regions:

• **NORTH AMERICA:** The world's biggest paper-making and consuming region, North America (U. S. and Canada) has the highest per capita consumption—169.2 kg. The U.S. alone produces about half the world's pulp and paper, supplying virtually all its own needs except newsprint, the bulk of which it imports from Canada.

Long-term consumption trends are sharply upward. U. S. consumption of newsprint alone, now running about 6.1-million tons yearly, will jump to 7.5-million by 1960 and 8.7-million by 1975, according to authoritative U.S. estimates. As

Paper By-products (Believe It or Not)

Ice cream cones and battery plates, grandpa's tonic, roadtops and chicken feed—all these things may start out in a paper mill, believe it or not. The secret lies in sulfite liquor, the chemical waste in which wood has been "cooked" into pulp for paper making.

Sulfite liquor is mostly water plus small quantities of lignin, woodsugars, and other organic chemicals. Once it was thrown away. But now it is used to make:

• Vanillin — a synthetic that has widely replaced vanilla as a flavoring for food products such as ice cream and cakes.

• Torula yeast—used as an animal feed or a protein or pharmaceutical supplement.

• Battery aid—a sulfite-liquor derivative that reduces the gathering of acid scale on battery plates, tripling their life.

• Nucleic acid — another derivative used as a diet supplement for elderly people.

• Road topper—a sulfite-liquor spray that improves gravel roads by first loosening their particles, then binding them into a hard surface.

• Rubber additive—lignin, added to carbon black, helps it disperse more evenly throughout synthetic rubber, improving the product.

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"The greatest actual and potential shortage is in newsprint."

for North America as a whole, the FAO predicts a rise in demand for all types of paper from 28.6- to 36.8-million tons by 1960-62, a 10-year gain of 29%.

North American industries have plenty of scope for expansion to meet these needs. But because production has traditionally been geared to local demands, exports have always been marginal (in 1950-52, for instance, only 1½% of total output). Nor are they likely to increase substantially.

Currently, softwood depletion is one of the region's biggest worries, since both U.S. and Canadian stands are being overcut. One result is a strong trend toward pulping of temperate hardwoods.

EUROPE: The coniferous stands of Scandinavia (Sweden, Norway, Finland) supply most of the wood and pulp consumed by Europe, the world's second largest paper-making and consuming region and biggest overseas exporter. But Scandinavia's softwood resources are already under full exploitation.

Per capita consumption, averaging 28.8 kg., is steadily rising (in West Germany, for instance, it is expected to soar from 43 to 50 kg. in the next few years). Over-all demand for paper and paper products will probably jump from 11.8- to 16.4-million tons by 1960-62, up 39% in a decade. But currently planned pulping expansions fall considerably short of this mark.

Exports of pulp and paper to the rest of the world, recently running at about 1.5-million tons annually (8% of output), form an important part of Europe's economy. Every effort will be made to maintain them. But the expectation nevertheless is that future production will be keyed closely to European demand, with exports limited.

LATIN AMERICA: Spurred by rapid industrialization, demand for paper and board is expected to shoot up from 1.5-million tons to 2.5-million by 1960 and 3.5-million by 1965. Per capita use, now ranging from 24 kg. in Argentina to less than 1 kg. in Haiti, averages 9.8 kg. It could jump 50% by 1960.

But current expansion projects fall far short of meeting such needs. Even if all were realized, the 20 republics could meet foreseeable requirements only by importing twice as much paper and three times as much pulp 10 years hence as they do today. The greatest actual and potential shortage is in newsprint. In 1950, the entire region produced only a pittance of 47,000 tons, against predicted needs of 900,000 by 1960 and 1.2-million by 1965.

Mexico is a case in point. Although at present fairly self-sufficient in kraft and other industrial paper, it imports every ton of its newsprint (65,000 tons last year). Argentina also relies heavily on newsprint imports although its newspapers are still held down to six or eight pages. So does Brazil.

But the region nevertheless has immense raw-material resources for papermaking. There are sizeable coniferous stands in Brazil, Chile, and Mexico; eucalyptus plantations in Brazil; bagasse in Cuba, Mexico, Brazil, and Argentina; plus wheat straw in Argentina. Already a start has been made in processing these materials.

But the greatest potential of all lies in the vast untapped forests of mixed tropical hardwoods, as in Brazil's Amazon valley.

FAR EAST: Half the world's people live in the Far East. They consume perhaps 2.5-million tons of paper and board yearly. Excepting Japan, per capita use is pitifully low—less than 1 kg. in India, only 0.1 kg. in Laos. But new drives toward higher literacy and industrialization ensure a steadily rising long-term trend.

Pinpointing future demand is difficult because of the imponderable factor of Red China. But certain it is that existing projects fall far short of probable long-term paper appetities.

Take India. Its consumption this decade may grow from 260,000 to 480,000 tons. The most urgent problem is how to meet a potential doubling of newsprint consumption —from 60,000 to 120,000 tons—by 1964. At present all newsprint is imported. But next year, Indian businessmen, helped by government finance, will open the first newsprint mill on the mainland of Asia —a $12-million American-supervised project at Nepanagar that will use imported pulp as well as local bamboo, straw, and bagasse (McG-H Digest, Jan '51, p 17). Its initial output will be 30,000 tons yearly.

The only potential exporter is Japan. Its paper output has soared from a prewar 1.2-million to 1.9-million tons, including 455,000 tons of newsprint. This permits per capita use of 20 kg. Production is still going up. By 1958 Japan hopes to be able to export 300,000 tons annually, including 54,000 tons of newsprint.

OCEANIA: After North America, the 13-million people of Australia and New Zealand enjoy the world's highest regional per capita paper consumption—43.1 kg. Demand is bounding upward at a pace that will probably hit 850,000 tons by 1960-62, up 52%. Half the region's needs are now imported. The rest is produced in Australia, chiefly from eucalyptus pulp.

But vast new expansions in New Zealand will help meet future needs. The largest is at Kawerau—a $78-million project, aided by government and U.S. Export-Import Bank funds, that includes building an entirely new community. Its giant mills, costing about half the total outlay, are scheduled to start operations late next year. They will turn out initially 75,000 tons of newsprint and 36,800 tons of sulfate pulp, using pine from what is believed to be the world's largest man-made forest. Later additions may boost the project's newsprint output to 150,000 tons.

But even these expansions will still leave the region considerably short of expected demand by 1960.

AFRICA: Paper-wise, the sprawling continent is dark indeed. Many of its 200-millions hardly know what paper is. Even allowing for relatively high consumption in South Africa and Egypt, over-all use is barely 2 kg. per capita.

Of present consumption—about 420,000 tons—three quarters, including all newsprint, is imported. By the new decade, allowing for projected expansions, the region would still have to import two-thirds of its paper to meet expected demand of 650,000 tons.

Atomic-Power Prospects for Next Ten Years

Based on its studies of possibilities of harnessing atomic power for commercial generation of electricity, General Electric Co. has formulated the following four-part credo.

1. Electric companies in the U. S. will own and operate a number of atomic-power plants within the next 10 years.

2. Some atomic plants will be full scale and will generate electricity at competitive cost, possibly within 5 and certainly within 10 years.

3. This progress will be accomplished without government subsidy for production-plant construction or operation (it is assumed that government-supplied fuel will be priced at cost-of production).

4. The two nuclear reactors best suited for earliest and most effective competition with conventional fuel plants in the U. S. are (a) the light water-moderated water-cooled boiling reactor, and (b) the graphite-moderated water-cooled reactor.

The company estimates the investment needed for boiling reactor plant at $243 per kw., against $160 for a coal plant; and electricity cost at 6.7 mills (0.67¢) per kw.-hr., against 6.9 mills (0.69¢). Estimated cost for a graphite reactor are: investment, $277 per kw; power, 6.8 mills (0.68¢) per kw.-hr.—Elec World, July 12, p99

New Solar Power Device

Latest solar power device, developed at Wright Air Development Center, Dayton, Ohio, uses a yellow cadmium sulfide crystal about the size of a lump of sugar to change sunlight into electricity.

Attached to opposite sides of the crystal are electrodes to which wires connect. The positive terminal is silver, the negative indium. Light, striking the crystal-electrode interface, produces a d-c. electrical potential.

A third of a volt is produced from a ½-sq. in. area in the pilot model. According to the inventors, a wafer-thin 4x14-ft. slab of crystal, built into the roof of a house, would supply enough current to operate all lights and appliances 24 hr. a day.—Electronics, July, p6

Helps Cut Accident Rate

Getting the safety message down to the worker is usually a tough problem. Colorado Fuel & Iron Corp. found that "Mr. Bones" quickly got workers and foremen thinking about safety.

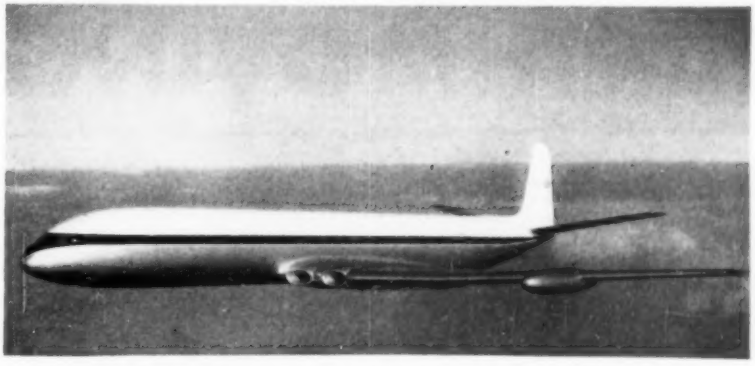
Mr. Bones is a skeleton and he could be found riding on a crane hook, jumping to the electrical arc of a fuse box, or hitching a ride on a fork truck. Well-publicized, Mr. Bones appeared in all phases of CF&I's safety program. Each worker was given small replicas by his foreman. Thus the safety message was carried to the employee.—Am Business, July, p52

Silicone-Coated Bottles

A common trouble with glass containers in the food-packaging industry is their vulnerability to damage. Because of their lack of lubricity, they tend to "seize" upon each other, causing scratches, loss of strength, and breakages.

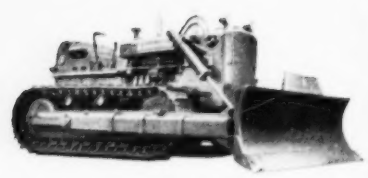
In a new technique, Brockway Glass Co. uses a silicone emulsion, developed by General Electric Co., to provide a protective, lubricating film to jars and bottles. The treatment minimizes damaging seizure and scratches, improves appearance and "feel" of jars, and cuts storing, filling, and shipping losses.

At the Brockway plant, the process boosted filling-line performance 14% while cutting breakage rate 90%.—Food Eng, July, p121

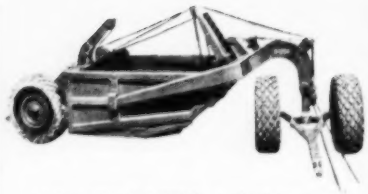


Newest Jet Transports—Boeing 707 and Comet 3

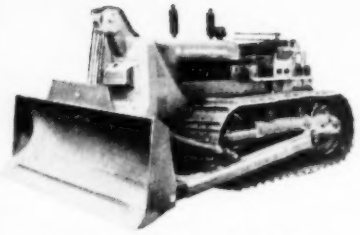
A new chapter in transoceanic jet transport rivalry was opened when the Boeing 707 Stratoliner-Stratotanker (top) made its first flight, followed a few days later by the de Havilland Comet 3. These pictures provide an interesting comparison of American and British design philosophies on configuration of four-jet transports. The 707's podded engines and 35° swept-back wings and tail follow accepted U. S. big-jet practice. In flight trials the plane exceeded 550 miles per hr. and reached 42,000 ft.—Aviation Wk, July 26, p14; Aug 2, p7, 63; Aug 9, p30



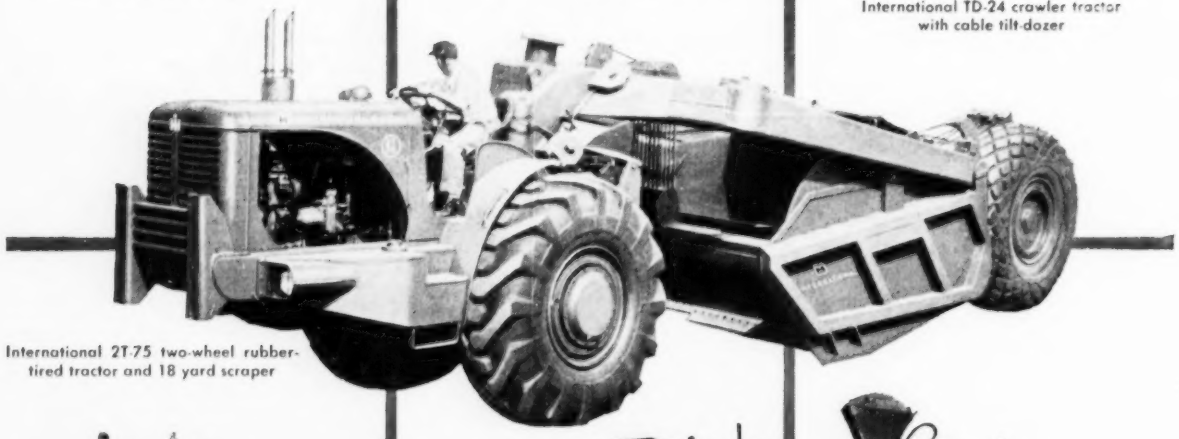
International TD-24 crawler tractor with hydraulic bullgrader



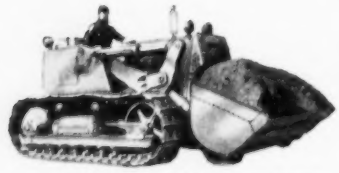
International B-250 four-wheel scraper for use with the TD-24 tractor



International TD-24 crawler tractor with cable tilt-dozer

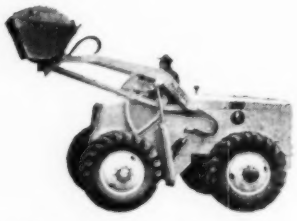


International 2T-75 two-wheel rubber-tired tractor and 18 yard scraper



International TD-14A crawler tractor with hydraulic skid-shovel

International 2T-75 two-wheel rubber-tired tractor and bottom dump wagon



Hough Payloader — 4-wheel tractor with front-end loader

1 source of supply for ALL your EARTHMOVING equipment

Now – grouped under the world-famous IH symbol – International offers a complete line of heavy-duty machines for every phase of earthmoving. This means that now, more than ever, your International Industrial Power distributor is your "Earthmoving Headquarters"– a single source of supply for machines, service and parts.

You'll find the right equipment to power your job faster, better and more profitably – backed up by unsurpassed service facilities and parts supplies to keep your equipment operating. You cut downtime, pile up profit-time *every time* with International.

A demonstration will prove that it's International "Power That Pays"– see your IH distributor today. International Harvester Export Company, 180 North Michigan Ave., Chicago 1, Illinois, U.S.A.

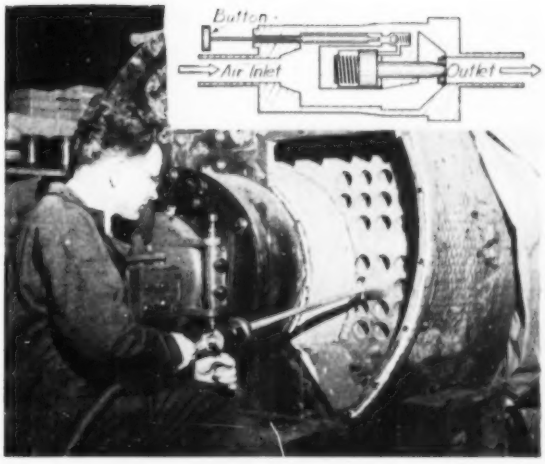
- Seven powerful crawler tractors headed by the giant TD-24
- Twenty-two matching hydraulic and cable controlled bulldozers, bullgraders and tilt-dozers
- Four 4-wheel scrapers matched for use with the TD-24 and TD-18A tractors
- Two high-speed, 2-wheel rubber-tired tractors with 18 and 13 yard scrapers
- High-speed bottom dump wagon with 20 yard capacity matched to the 2T-75 tractor
- Eighteen 6 and 4 cylinder diesel and carbureted power units
- A complete line of auxiliary equipment including cable control units, generators, pumps, pipebooms, skid and dozer shovels

INTERNATIONAL INDUSTRIAL POWER

Power to move the earth

New Ideas Tell How To . . . .

. . . percussion-clean boiler tubes



This percussion lance, shown in the hands of its inventor, L. C. Nesham, cleans boiler, economizer and air-preheater tubes on an entirely new principle. When the button is pressed, the valve opens and shuts automatically 1,500 times per min.

That converts the steady potential energy in an air or steam line into a powerful kinetic force acting on the surface being cleaned. An 80-lb.-per-sq.-in. air line can thus give cleaning effect of 1,600-lb.-per-sq.-in. steady pressure.

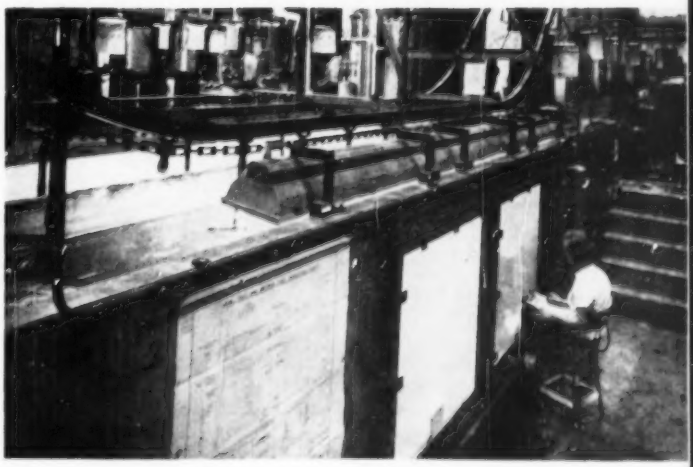
The lance is said to clean a 300-tube waste-heat boiler in 30 min. It can also clean coal bunkers and large electric generators.—Power, Aug, p138

. . . boost ammonia-fertilizer sales

Two vice-presidents of Phillips Petroleum Co. portray what they hope will become common—the sale of ammonium sulfate in the company's and its dealers' service stations. They hope that the motorist, stopping for gasoline, will take home some fertilizer for his lawn or garden; or that when he comes for fertilizer, he also will buy gasoline.

This merchandising idea springs from Phillips' increased production of ammonium-type fertilizers. It's also in line with the general marketing philosophy of oil companies to sell as many petroleum products as possible directly to consumers.—Pet Proc, Aug, p1221

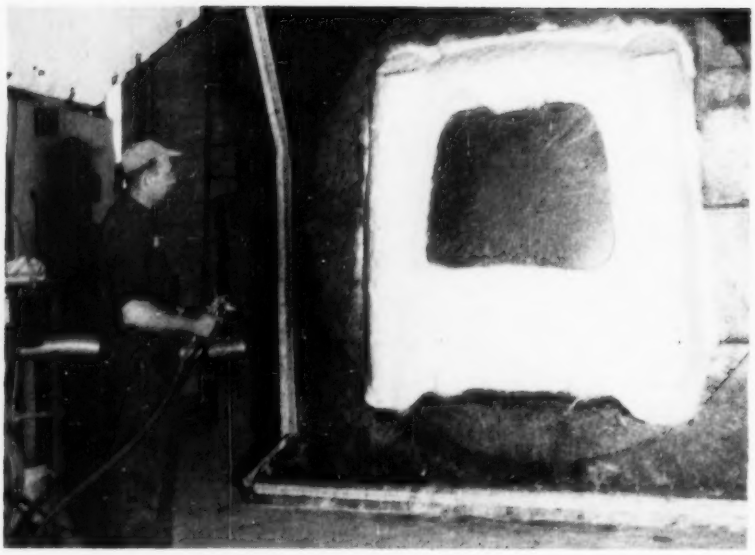
. . . test for leaks at low cost



This system permits inspection for leaks and breaks in tubing of 3,500 refrigerator compressor units daily, at low unit costs.

Units filled with dry air at 200-lb.-per-sq.-in. pressure are conveyed through the rear tank for underwater testing. The inspectors simply watch for bubbles indicating leaks in the warm water. The ¾-in. glass walls give good visibility.

After passing this test, units continue to move up into the drying ovens. While units are still moving along on trolley conveyors, air is evacuated. Units are then charged with Freon 12 and oil, at 180 lb. per sq. in. Now moving around to left, they enter the foreground tank for a second test. System is installed at Westinghouse Electric Corp.'s Mansfield, Ohio, plant.—Factory, Aug, p96



1 OPERATOR SPRAYS bonding emulsion to preform screen. Chopped glass roving has previously been sprayed. Suction holds fibers to shaped screen.

2 PREFORMER DOOR is closed so heat can be applied for curing.

High-Volume Glass-Plastics

Special methods, equipment, molds assure high production of reinforced-plastics automobile-body parts. Techniques apply to other products

IT REQUIRES a lot of know-how to compression-mold glass-reinforced polyesters in really large pieces. Molded Fiber Glass Body Co., Ashtabula, Ohio, has plenty of experience mass-producing sports-car body pieces. Its techniques can apply to any other high-production, reinforced-polyester product—bathtubs, aircraft parts, furniture, boats.

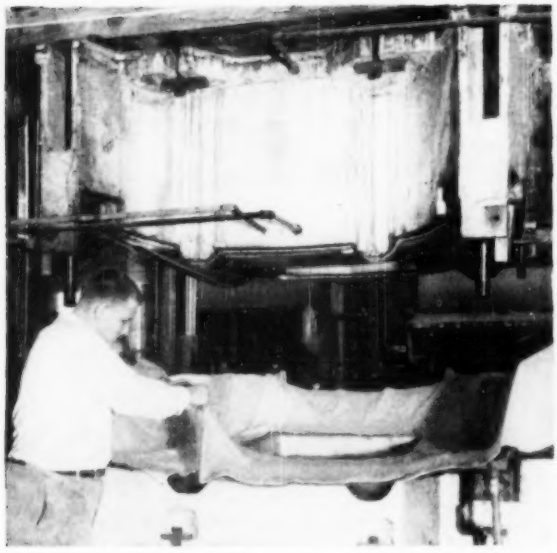
At Molded Fiber Glass Body Co., all molds are machined out of either high-carbon steel plate or alloy castings. All the larger parts are made from chopped glass-fiber preforms. Size of the largest part is 120 in. long, 70 in. wide, and 26 in. deep; weight is 85 lb. Most of the machines are specially designed.

Largest of 25 presses in the plant is a 600-ton unit. It has a platen area of 7×12 ft., a maximum stroke of 50 in., and adjustable daylight depth from 58 to 80 in. All molds are cored for steam circulation. Two boilers supply steam at 50-lb-per-sq-in. pressure and 280° F. temperature. Pressure reducers at each press secure the desired temperature.

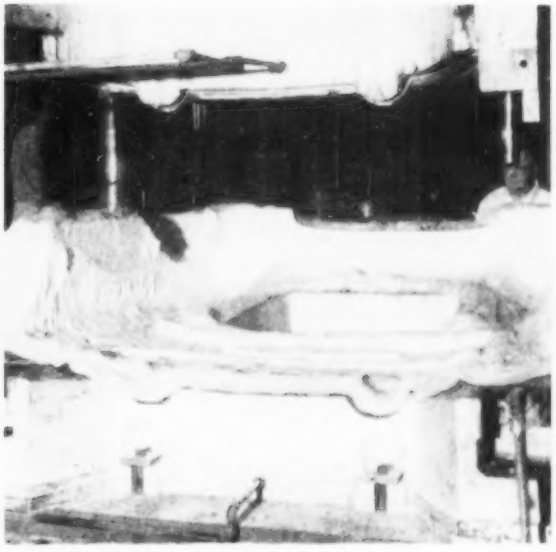
A large gas-heated oven sets the bonding emulsion on all but the largest of the chopped fibrous-glass preforms. A pusher-type loader passes the preforms, still on their screens, through the oven. Temperature is held at approximately 350° F. The resin sets in a matter of minutes. Set-up time is not critical so careful time control is not needed.

Larger preforms set up with the screen and preform still mounted on the turntable of the preformer. A counterweighted door is mounted to swing down on the preform and completly enclose it. Gas-fired units furnish the heat for the short time necessary to set up the emulsion. The preform is then removed from the screen.

PORTABLE EQUIPMENT chops and sprays glass fibers. Rovings are drawn through cutter; chopped pieces are sucked into venturi and blown out tube.



3 TWO LAYERS of glass "veil" are laid in cavity of mold. Veil eliminates wrinkles on curved sections.



4 PREFORM has been laid on veil, and resin applied. Layup is ready for mold closing and curing.

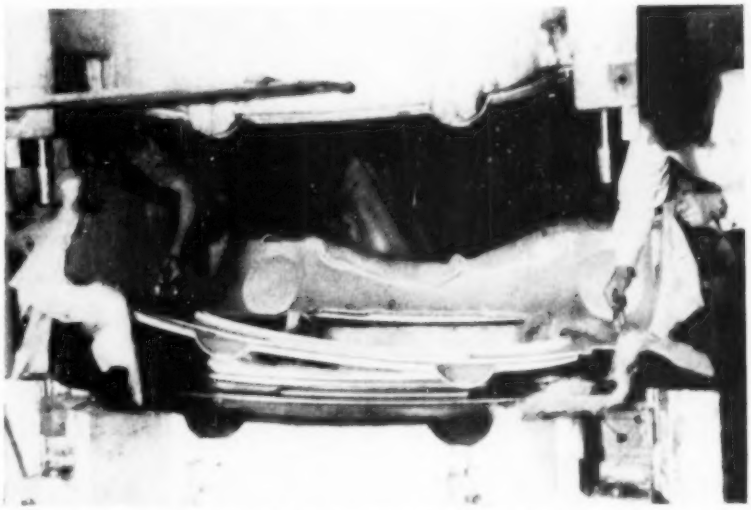
Combining preformer and oven in one unit eliminates handling large, heavy screens.

One section of the plant is devoted to mixing resin with fillers, inhibitors, and catalysts. A high volume of resin is handled each day. The mixing operation is further complicated by the fact that different parts require different mixes. Scales, mixers, and electric chain hoists on overhead conveyors speed the operation.

We can get an idea of how the company solved some unusual molding problems by following a component through production. The component weighs 36 lb., measures 70×73×19 in., and has a uniform wall section of 0.100 in. It is molded on a 400-ton press.

The first step is shown in Fig. 1. The operator has just completed distributing the required weight of glass onto the preform screen, while periodically spraying the glass with bonding emulsion. Fig. 2 shows the operator closing the preformer door, preparatory to turning on the heat to set up the bonding emulsion.

The surface of each exterior body part has either one layer of 0.030-in. Fiberglas overlay mat or two layers of 0.015-in. overlay mat. Two layers are used where it is necessary to prevent wrinkles that would occur when one layer is applied to parts having compound curvatures. This mat, or "veil," is made up of gossamer-fine threads of Fiberglas and gives to the surface of the molded part a fine finish.



5 PRESSURE APPLIED by the closing mold uniformly distributes the resin throughout the preform fibers. After a 4-min. cure, piece is removed.

In Fig. 3, the press operator is laying up this overlay mat in the mold. The chopped-fiber preform will be placed in position and the required amount of catalyzed and inhibited resin will be applied. Because of the long flow needed for this piece, the resin mix is inhibited to permit it to flow for a longer period of time.

Fig. 4 shows the resin-impregnated preform in position just before the mold is closed. At 240° F. only 4 min. of curing time is needed.

In Fig. 5 are shown two press operators removing the cured piece from the mold. Suction cups attached to handles facilitate this operation. A flame-hardened cut-off at the parting line simplifies flash removal. Excess fibers are cut through during the molding operation.—Mod Plastics, Aug, p115

The Results of Half a Century of Experience

High efficiency of industries would have turned out to be a dream without powerful aid of the modern transportation facilities headed by the electric cranes.

Hitachi, Ltd. now enjoys an established fame as the top manufacturer of cranes, its latest achievements including the 400-ton Overhead Travelling Crane supplied to the Maruyama Power Station, the largest ever built in Japan.

Hitachi, Ltd.

Tokyo, Japan

Cable Address: "HITACHY" TOKYO
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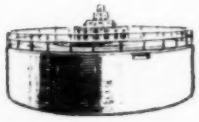
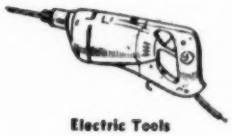


Generators

Rolling-Stock

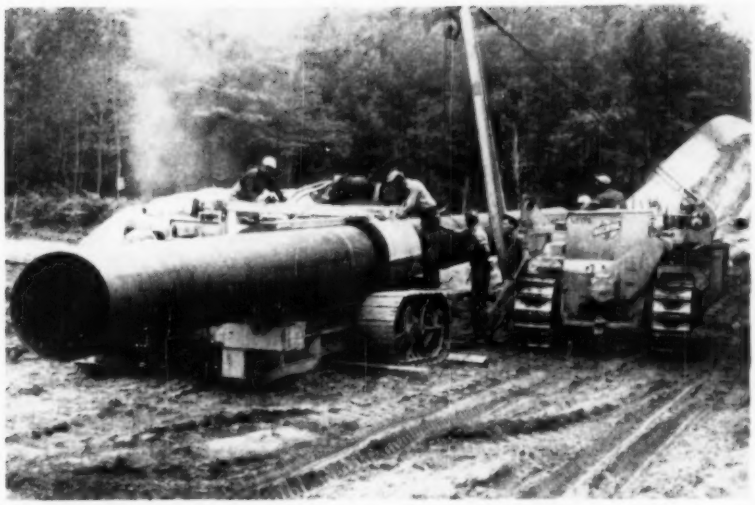
Cranes, Winches & Power Shovels

Telephones & Switchboards



Electric Tools

Malleable Iron Castings



PIPE IS BENT in hydraulic horizontal bender to conform to trench bottom. Pipe is lined up alongside trench. Some sections needed 50 bends per mile.

JOINT is added by sideboom. Single weld ties it into line. Lengths are 40 ft.

Lays Big Pipeline Fast

PUNCHED THROUGH northern Wisconsin and Michigan down under the deep Straits of Mackinac and all the way across Michigan's lower peninsula, the 640-mile Lakehead pipeline extension from Superior, Wis., is now carrying Alberta, Canada, crude oil to Sarnia, Ont. Its 30-in. dia. makes it the largest crude-oil line in the U.S. Rock, swamps, and heavy forests—as well as more than 200 highway, rail and river crossings—made the job of laying the 30-in. pipe a tough one. But under Bechtel Corp., agents for Lakehead Pipe Line Co., the job was completed on a fast schedule.

Where the terrain permitted, a ditcher excavated the trench to a 5½-ft. minimum depth. In rock, a back hoe cleared the trench after blasting. More than 10% of the line was laid in rock. Protection against corrosion was afforded the pipe with two layers of glass-fiber cloth saturated with hot coal-tar enamel. Various other phases of the pipelaying operations are shown here.—Const. Meth & Equip, Aug, p62

LENGTH is fitted over line-up clamp that holds it while bead is applied.

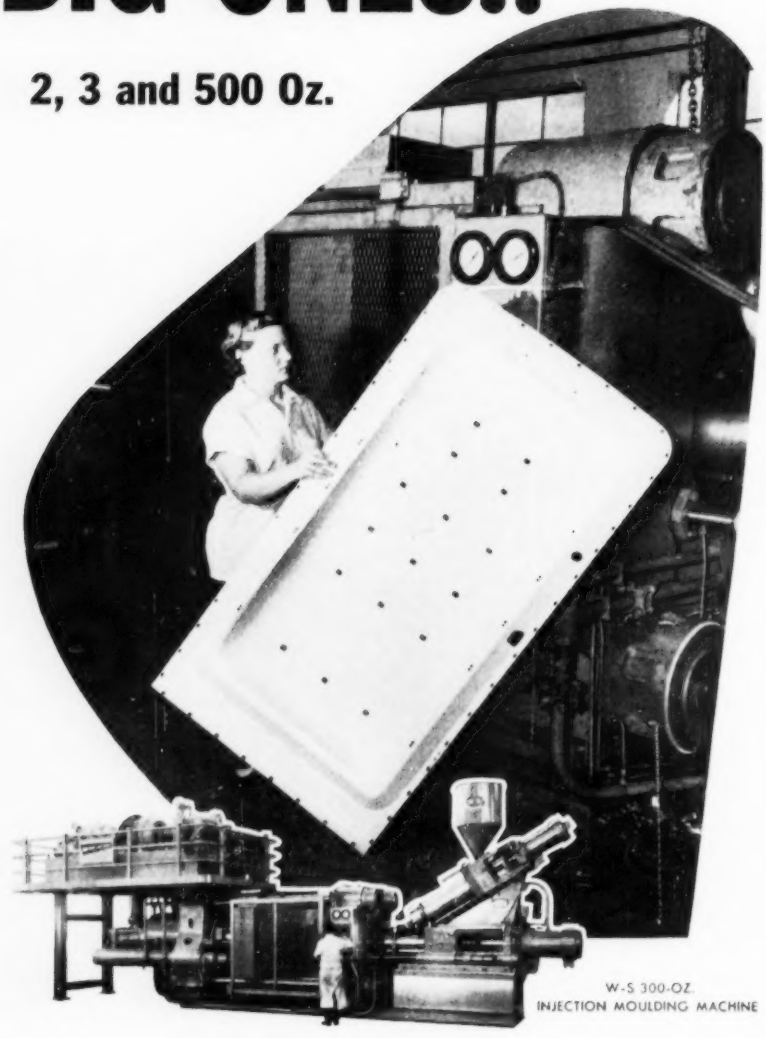
TRENCH DEPTH is sufficient to provide 3-ft. cover over line. Tow tractor gives ditcher help going up steep slope.

FINAL PROTECTION is added by coat and wrap machine. Machine covers 1½ miles daily. Pipe is ready for trench.

for the

BIG ONES..

2, 3 and 500 Oz.



W-S 300-OZ.
INJECTION MOULDING MACHINE

Watson-Stillman Plastics Injection Moulding Machines equipped with preplasticizing units offer more clamping capacity, larger die space and higher plasticizing rates. Positive feed controls, internally heated torpedoes and the latest safety features give you greater operational efficiency . . . assure capacity production runs.

For complete specifications write today for Bulletin Sheet 620-G8.

W-S HYDRAULIC

EXPORT DEPARTMENT

THE WATSON-STILLMAN COMPANY

DIVISION OF H. K. PORTER COMPANY, INC.

150 Aldene Rd., Roselle, New Jersey

House Framework Built of Welded Sections

First of its kind to go up along the Atlantic Seaboard in the U.S. is a welded steel home in New Jersey. The construction cost is about $10 per sq. ft. With conventional building methods, the cost would be $13.50 per sq. ft.

The framework is lightweight steel sections tied together by welding. Joists are 14-gage steel, 10 in. deep for the floor and 8 in. deep for the ceiling. Wall studs are channels, 3⅝ in. deep and made of 16-gage steel; webs are punched or solid. Double studs (two welded back to back to provide a nailing groove) are placed to act as framing for windows.

Expanded metal lath is tied on the inside and outside flanges of the studding to serve as wall panels. A 2½-in. cavity between interior and exterior walls is filled with an asphalt emulsion containing fiberglass and asbestos; this acts as a vapor seal, preventing moisture from penetrating the wall.

Exterior lathing is covered with two coats of cement and a finishing coat of stucco. Inside walls and ceiling receive three coats of plaster. For the roof, a 2½-in. woodfiber and cement insulating board is nailed or clipped to the surfaces of the ceiling joists. Over this decking, a five-ply roof is built up of asphalt paper and hot tar and completed with a layer of white mineral chips.

The completed house is fireproof, rotproof, and termiteproof. Maintenance costs will be low.—Weld Eng, Aug, p17

In the Next Issue

Statistics show eight out of ten new products fail when placed on the market. A major force in making new products succeed is your marketing program. What constitutes a sound marketing program is the subject of a November feature article. Case studies of companies that have successfully introduced new products will illustrate the article.

Fatty Acids: Where Their Future Lies

Source	Type of Acid	End Uses
Animal fats (tallow and grease)	Stearic acid	Soaps, detergents, cosmetics, candles, rubber, drugs, metallic soaps
	Oleic acid Fatty-acid mixtures	Suflonated oils, soft soaps, textile soaps, emulsifiers, alkyd resins, plasticizers
	Some hydrogenated to stearic acid	Chemicals, rubber compounding (see stearic above)
Fish and marine mammal oils	Linolenic acid	Alkyd resins, drying oils, floor coverings
	Some hydrogenated to stearic acid	See stearic acid (above)
Vegetable oils **1. Coconut – including palm, palm kernel, babassu**	Lauric-type acids Other saturated acids	Soaps, fatty alcohols, emulsifiers, cosmetics, plasticizers, rubber compounding alkyd resins
	High palmitic	Intermediates, emulsifiers, soaps
2. Soapstocks **(a) Cottonseed**	Oleic, linoleic, & palmitic	Soaps, polishes, alkyd resins, protective coatings, floor coverings, greases, flotation agents
(b) Soybean	Oleic, linoleic	

Fatty-Acid Use Grows

Trend toward fatty acids is broadening their application into more industries. Their outlook, both marketwise and technical, is bright

FATTY-ACID PRODUCTION this year in the U.S. should go to from 385- to 390-million lb., well over 1952's output of 365-million lb. although slightly under 1953's top-of-the-boom output of 397-million lb. The near future: 450-million lb. yearly.

Meat packers and renderers are promoting their use, trying to find profitable outlets for their mounting surpluses of tallow and grease. Animal fats will account for 45% of total fatty-acid output this year.

Soap manufacturers have normally consumed about four-fifths of domestic consumption of tallow and grease. Even though soap sales are yielding to detergents, soap makers are increasing their relative consumption of fatty acids. Reasons:

- Easier, faster, more controllable saponification.
- Greater flexibility—easier to change product characteristics.
- Savings in equipment costs and steam.
- Higher soap yield than with whole oils or fats.

Fatty acids are of growing importance to makers of metallic soaps (lithium, calcium, etc.) for use in commercial greases. The new grease formulations need their uniformity.

The textile industry is probably the widest user of soaps. Fatty-acid mixtures are applied to wetting, softening and scouring agents.

Protective coatings (paints, varnishes, alkyd resins) are the biggest user of vegetable fatty acids, followed by soaps. Alkyd resins consume more unsaturated vegetable fatty acids than does any other end product.

The rubber industry is served too by fatty acids, although not in as many functions as in textiles. It accounts for over one-fourth of annual stearic acid consumption. Fatty acids, as softeners, help to disperse carbon black and certain pigments in hot rubber. They also help to solubilize zinc oxide activators and, during milling and extruding, aid lubrication.

Technical future of fatty acids is bright. Derivatives — esters, amides, nitriles—are leading to new emulsifiers, plasticizers, surface-active agents.—Chem Wk, July 17, p85

Dirty Coolant Sumps Cause Worker Dermatitis

Dermatitis resulting from exposure to contaminated machine coolants can be prevented by adding bacteria killers to the coolant. But one company, Manning, Maxwell & Moore, Inc., Stratford, Conn., found that, even though it used a bactericide, it had cases of dermatitis among its workers.

A thorough study showed that ineffective flushing and irregular cleaning of the coolant sump system were at fault. This permitted bacteria growth despite disinfectant additives.

The company now uses an all-chemical machine cleaner to purge the sump system and to scrub tool parts. A vacuum pump now drains the sump. In addition a regular schedule for cleaning each machine has been set up. As a result, dermatitis cases have dropped to zero.—Factory, Aug, p109

In URUGUAY...

as in Countries Throughout the World

WILLYS Brings Progress

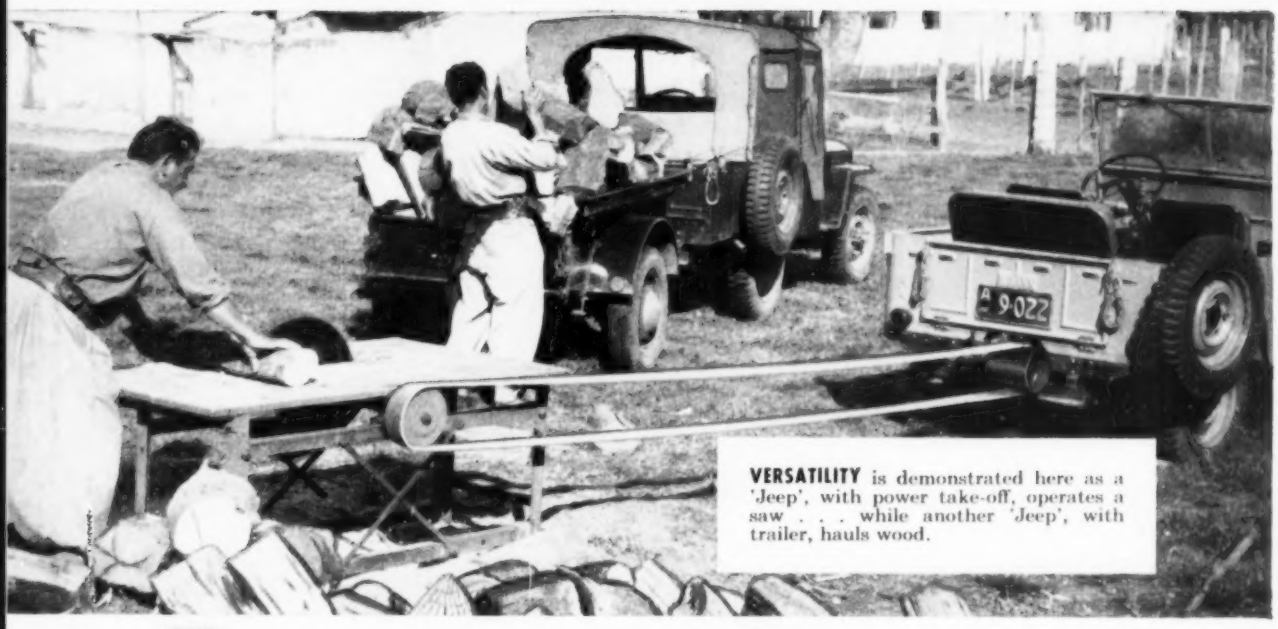
LOADED WITH BREAD, a baker's 4-Wheel-Drive Willys Station Wagon starts the day's delivery. The greater utility of Willys vehicles make them a favorite for business and family use.

SHEARING SHEEP WITH 'JEEP' POWER. Through its power take-off, the 'Jeep' in the background supplies smooth, steady power to a belt and pulleys which, in turn, operate the shearing machinery.

HUB-DEEP AND HEAVILY LOADED, yet this new 4-Wheel-Drive Willys Truck goes through. Its new six-cylinder engine provides plenty of reserve power for even heavier pulling.

HOME OF AMBROIS AND COMPANY in Montevideo, the Willys-Overland distributor for Uruguay. Through the modern facilities of this highly-capable and enthusiastic distributing organization, Willys-Overland brings The World's Most Useful Vehicles to the people of Uruguay.

ON THE BUSY DOCKS of Montevideo, Willys 4-wheel-drive utility vehicles are much in evidence as they haul cargo between ship and shore. Above, a 4-Wheel-Drive Willys Truck is about to pull away from the side of a newly-arrived ship with a fully-loaded, heavy trailer.



VERSATILITY is demonstrated here as a 'Jeep', with power take-off, operates a saw . . . while another 'Jeep', with trailer, hauls wood.

in Transportation —

THE 'JEEP' CLEANS A RESERVOIR in Montevideo's water supply system. Four different makes of trucks were tried on this job and failed—only the 'Jeep' could scoop out the heavy accumulation of mud and silt.

The World's Most Useful Vehicles

Uruguay, smallest of the South American republics, is a flourishing agricultural land where the production of wool and meat is the most important industry . . . and the 'Jeep' is the foremost method of transportation.

The cattlemen and woolgrowers of Uruguay long ago discovered the versatility of the 'Jeep'. It supplies power to shear the sheep . . . hauls wool to market . . . and on Sunday it takes the family to church. It fulfills the demand for on-the-road and off-the-road stamina, as only Willys 4-wheel-drive vehicles can.

In truth, many farms and ranches have enjoyed their greatest period of prosperity since Willys introduced The World's Most Useful Vehicles into Uruguay.

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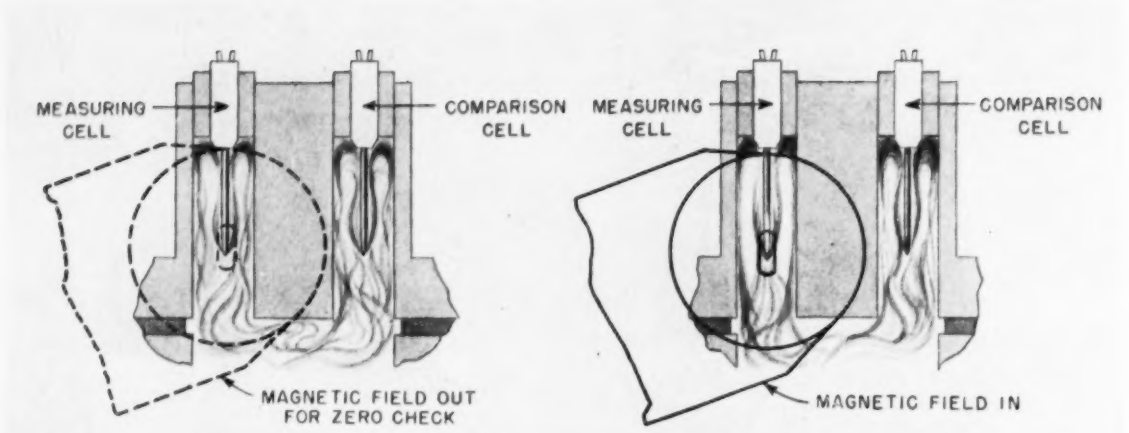


OXYGEN ANALYZER gives a continuous record of the excess-oxygen content in flue gases. In the left-hand view, the magnetic field is "swung away" from the cell for zero check. Operating position is with magnetic field in.

Instruments Can Cut Fuel Bills

If you operate process heaters or boilers in your plant, you can make substantial savings by boosting combustion efficiency through better instrumentation

THAT'S HOW Socony-Vacuum Oil Co. did it in its East Chicago refinery. The result: annual savings in fuel costs of $32,000 to $34,000.

The company attributes its success to:

- Management support.
- Assignment of responsibility to one engineer.
- Installation of oxygen analyzing systems.
- Education of plant operators.

Effort toward increasing combustion efficiency began in 1949 when an Orsat analysis of flue gases showed excess air at unit heaters averaging 43%. That represented 6.7% excess oxygen. Improved practices in draft and burner adjustments, plus furnace and burner maintenance, soon brought excess oxygen down to 4.9%. Then oxygen analyzers were installed to provide continuous monitoring of the oxygen content of the flue gases.

Ideal conditions for excess oxygen would be 0%. But the best practical percentage is between 3 and 4%, so Socony-Vacuum tries to reach and maintain that amount. Cost curves derived by the company show, for example, that with fuel at $1.72 per bbl., reducing excess oxygen from 6 to 3½% in a reduced crude heater on a catalytic cracker cuts fuel costs by $26 per day.

Socony-Vacuum has installed four analyzers: one on the polyform unit heater, one on the combination unit heater, one operating on ½-hr. cycles on the crude and reduced crude heaters, and one on a boiler in the boiler house.

Operators watch the continuous recorders and keep excess oxygen within 3 and 4% by damper regulation, air control, and checking plenum-chamber pressure.

Operation of the oxygen analyzers is based on the magnetic property of oxygen. It is unique among other common gases in that it is attracted strongly into a magnetic field. Other gases are slightly repelled from the field.

The left-hand flow passage in each sketch is the measuring cell; the other is the comparison cell. Without a magnetic field, the two cells are identical. Flue gas diffuses into both and cools the heated resistor elements equally.

When the magnet creates a strong field in the measuring cell, oxygen-bearing gas is attracted into the cell, where it cools the resistor. In so doing, the oxygen loses its magnetism with its rise in temperature.

Heated gas moves out of the magnetic field, upward along the resistor, and downward along the walls as more magnetic gas comes in from below. The result is a flow rate and cooling effect in definite relations to the magnetism of the gas sample.

Cooling both the measuring and comparison cells causes their electrical resistances to be reduced, but not in the same amount. Recording the difference in resistance, which is due to the oxygen content, indicates excess oxygen in the flue gas.

Heater and furnace operators now have a chart showing oxygen content, and they make adjustments accordingly. No longer do they have to fire furnaces by "sight," which can waste fuel.

The initial cost of $6,000 for the four analyzers has been repaid many times by the fuel saving. Maintenance costs also are low. Socony-Vacuum estimates that they run only 20% higher than those for a conventional flow controller. None of the analyzers has had to be overhauled since installation 5 years ago.—Pet Proc, Aug, p1200

Computers Promise

. . . new applications as automatic machines "create" new factories. But man remains dominant

THE GIANT COMPUTERS are often described as doing a job in seconds that would take an army of clerks weeks to perform. Generally, this is a misleading conception. Computers are simply information processing devices. They complement man's deductive processes, but they cannot compete with the human mind.

In terms of replacing men, the present-day computer is equal to the task in only a limited area. It surpasses men only where a multiplicity of elementary operations is required. Where the governing relationships in a process are extremely complex, or ill defined, the computer cannot begin to compete with its human counterpart. At best, a computer can perform over limited ranges of variation in complex systems. Outside of these ranges man must supplement it.

Reproducibility is the computer's top quality. The computer handles a given set of conditions in precisely the same way each time it arises. Only a computer, therefore, can convert optimum operating conditions from a goal to a reality.

What does the future hold for computing machines in the control field? Among applications of computers for control, the immense problems of continuous flow processes and distribution systems appear outstanding. There is an interesting application in the machine-tool field. General Electric Co. has an experimental record-playback engine lathe. Every action of a skilled operator turning out the first piece is recorded. For succeeding pieces the tape is played back and identical operations are performed without the operator.

Such a tool should have infinite applications in the underdeveloped areas of the world where skilled labor is at a premium. Logically, factories equipped with such automatic devices could "create" new factories.—Control Eng, Sept, p64

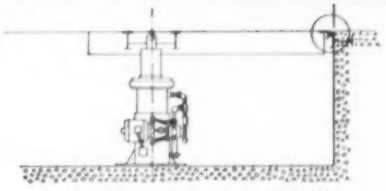
Here's how a public utility SOLVED its truck-loading problem with a GLOBE self-leveling RAMP

This is the problem:

The shipping-room floor of one of the buildings of a public utility is above the level of the paved driveway outside. There is no outside loading wharf. It would cost too much—and delay shipments—to have men lift heavy loads from shipping floor to truck bed. What's more, it would increase the risk of injury to workers.

This is the solution:

The problem was solved by installing a standard Globe type C-68E self-contained, self-leveling ramp. No ground excavation was needed. Power cylinder, electric-motor oil pump, oil reservoir are a single integral unit resting on a gusseted base plate. Loaded hand trucks are rolled across this hydraulically-powered platform quickly and *safely*—there is no delay in loading and unloading operations. The 14 inch lip of the Ramp rests on the truck bed and the Ramp rises or lowers as the truck springs flex under changing loads. Roll-over capacity is 16,000 pounds. When not in use, the Ramp is lowered and the overhead door brought down to close the entrance completely. This Globe OiLIFT eliminates the need for an outside platform . . . makes it easy to provide a *sheltered* wharf.



This diagram shows a typical GLOBE self-leveling RAMP installation.

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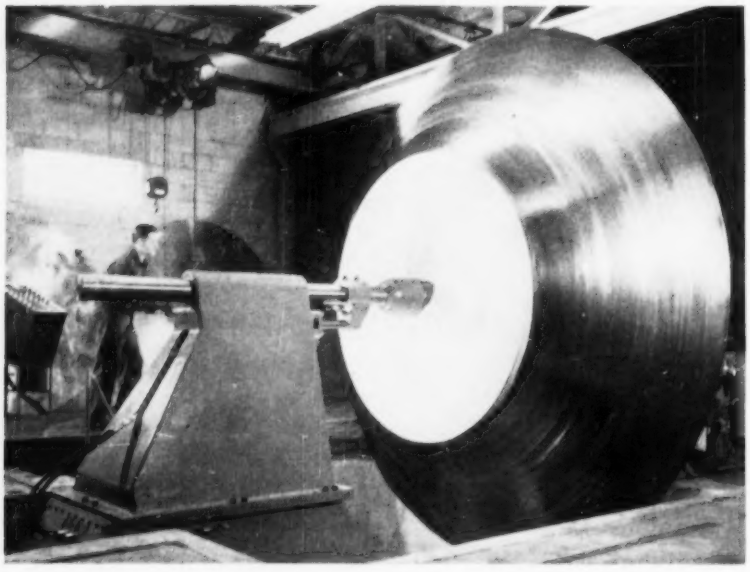


Large Lathe Can Spin Shapes to 72-In. Depth

This 180-in.-swing metal spinning lathe, recently built by Phoenix Products Co. for its own use, is claimed to be the world's largest. It will spin parts for atomic-energy plants and air-conditioning equipment. Portable panel controls operations. Tools are hydraulically actuated. The lathe can spin $\frac{3}{8}$-in. steel or $\frac{1}{4}$-in. aluminum to 72-in. depth.—Am Mach, June 21, p174

Lignin Use—It's news when someone develops a good use for lignin. West Virginia Pulp Paper Co. is making news with a new mill for producing lignin-rubber coprecipitates. Use: as a reinforcing agent in rubber manufacture to compete with carbon black and mineral pigments.—Chem Wk, June 26, p62

Powdered Apple Juice—A beverage of excellent fresh fruit flavor can be made from a powdered apple-juice product developed by U. S. Dept. of Agriculture. Powder is processed in a low-humidity atmosphere to avoid lumping. Dissolved in water, 4 oz. of powder yields about 25 oz. of beverage.—Food Eng, July, p78

More Ethylene—Significant aspect of petrochemical production is the growth of chemicals derived from ethylene. To meet this growth, ethylene production has risen 30% during the past 4 years. Demand by 1956 should rise from last-year's figure of 2.1-billion lb. to 3-billion lb.—Oil & Gas J, Aug 9, p95

Shell Molding—Ford Motor Co., Ltd., England, has modified shell molding to cast valve rocker arms. Sand-resin mixture is compacted in core boxes instead of molded into shells. Stack is then built up for pouring as a unit. Advantages: better casting, less floor space needed, several machining operations eliminated. — Mach, July 10, p1209

Sand-core Dryers—Foundries can make many sand-core dryers at low cost with Fiberite 4030, a fibrous glass reinforced phenolic high-impact thermosetting material, developed by Fiberite Corp., Winona, Minn. After the first dryer has been cast, duplicates can be quickly and accurately made from the new material on an inexpensive, low-temperature, low-pressure press.—Mod Plastics, Aug, p234

Titanium Carbide—Containing no tungsten, new titanium carbide cutting material has been developed by Firth Sterling, Inc. Nickel is binder instead of cobalt. It has high wear resistance and reduces cratering action of steel chips.—E&MJ Met & Min M, July 22, p7

Barometer Blues—The weather has long been blamed for aches and pains in rheumatic muscles and joints. Now, another complaint against bad weather, made by the manager of a 3,000-employee company, claims a 10% drop in work efficiency on unpleasant days. People are more forgetful, make more errors, are more irritable. A partial answer may be air conditioning.—Paper Ind, July, p392

Home-movie Sound—Sound with 16-mm. home movies can be obtained by means of magnetic striping on the side of the film. But 8-mm. film is too narrow for similar adaptation. Now a new electronic control system permits use of a standard two-track magnetic tape recorder with any movie projector to achieve synchronized sound. Installed cost of control unit and accessories is expected to be about $100.—Electronics, July, p20

Bolt Preloading—Douglas Aircraft Co. has developed a method of preloading bolts without the use of torque wrenches. It is a washer consisting of two concentric rings. Tightening the nut until both rings bind gives the desired preload.—Prod Eng, Aug, p195

Heavy Fuel for Diesels—Eleven engine-years' operation with bunker-C fuel oil at Clay Electric Co-op, Florida, showed savings far exceeding the increase of maintenance and operating costs needed to keep diesel engines in condition to tolerate this heavy fuel. During the period, 2,875,655 gal. of bunker-C were burned without blending in light fuel. Average fuel cost saving was $0.05213 per gal.—Power, July, p120

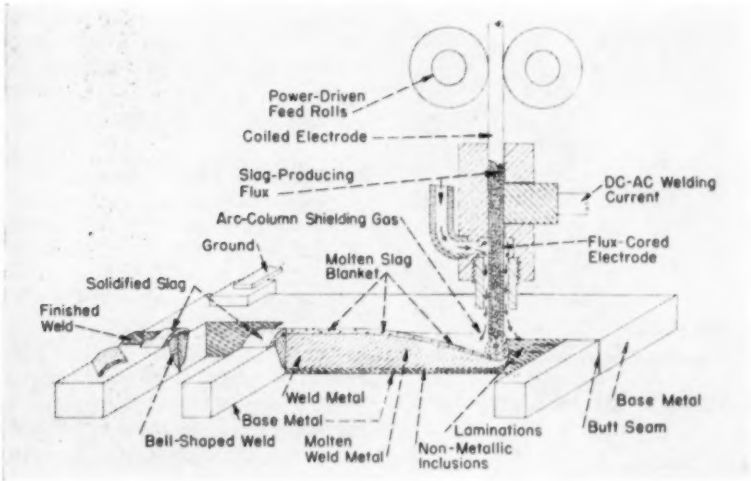
Signs Speed Inspection—Time and footsteps are saved at Dalmo Victor Co., Calif., by "Inspect" signs that can be hung from brackets on machines. When a part is ready for inspection, the foreman puts up a sign. Inspector checks the part, then takes down the sign and returns it to the foreman. Inspectors can often check parts in fixtures instead of moving them to inspection benches.—Factory, July, p96

Digging Circles—Faced with digging circular foundation trenches for small grain storage bins, a contractor came up with a novel solution. He brought in a small trencher. It was hooked to two radius rods from the center of the circle to be excavated and set to dig its way around, cutting the required foundation trench.—Const Meth & Equip, Aug, p6

Electronic Pulse Checker—"Palpatron" developed by Gillmors, Inc., Hicksville, N. Y., keeps a constant check on a patient's pulse beats during major surgical operations. Consisting of an electronic pickup about the size of a wrist watch, a 7-ft. cord, and a dial and indicator, it is more sensitive than doctors' fingers, registering even the weakest beats.—Business Wk, July 17, p98

Chlorophyll Research—Denver Research Institute announces promising new use. Chlorophyll derivatives seek out tissue that's healing—a characteristic of cancer. This indicates its possible use as a carrier to take radioactive materials to cancerous areas.—Chem Eng, July, p107

Small Diesel—The Petter PAZ-1 is claimed to be the smallest all-purpose diesel engine on the market. It is an air-cooled, single-cylinder, 1½- to 2½-hp. diesel suitable for a wide range of industrial and agricultural uses. Maker is Petters Ltd., Staines, England.—Mach, July 24, p1334



Slag-Gas-Shielded Arc Welding

Totally new welding method has been announced by Bernard Welding Equipment Co. It shields the welding area by both flux and a shielding gas. The flux is incorporated with the electrode as a core, not as a coating. The flux melts and forms a shielding blanket of slag. The gas, carbon dioxide, shields the arc column. The torch, held by the operator, has current, gas, electrode, and cooling water all passing through its handle. Deposition rate of weld metal is 10 to 40 lb. per hr., compared with 2 to 8 lb. for conventional flux-coated methods.—Weld Eng, July, p38

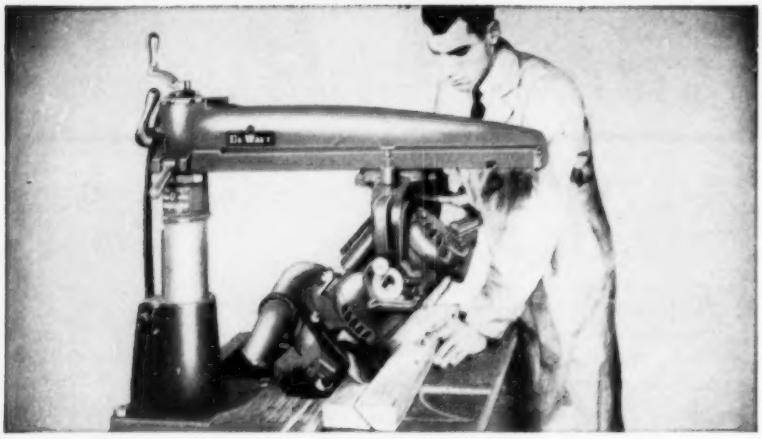
Rubber Drain Pipe

Simple squeeze of trap cleans new Austrian drainpipe. Two rubber parts replace ten metal parts for standard drainpipe at one-quarter the cost. Special rubber compound resists attack of acids, alkalis, and oils and greases. Manufacturer is Oesterreichisch-Amerikanischen Gummifabrik Semperit A. G., Vienna.

Employee Motivation—Effects of "reprimand" and "praise" on amount of work turned out by groups of individuals were studied. Psychologically, best results were obtained through private reprimand or public praise of people. Worst results come from use of sarcasm, either privately or in public.—Am Business, June, p6

New in Research—Institute of Bacteriology at Liège, Belgium, claims speeded-up evaluation time for antibiotics. Faster evaluation calls for large-scale testing. The institute can supply the greater quantities of material needed as it contains a full-scale fermentation plant used only for making test antibiotics.—Chem Wk, Aug 7, p54

Film Controls Riveting—A riveting machine developed by Consolidated Vultee and General Riveters, Inc., features a five-channel film-index control system. Mechanical "feelers" find punched holes in 35-mm. film and relay information to drilling and riveting heads. Three films control all operations.—Am Mach, July 19, p160



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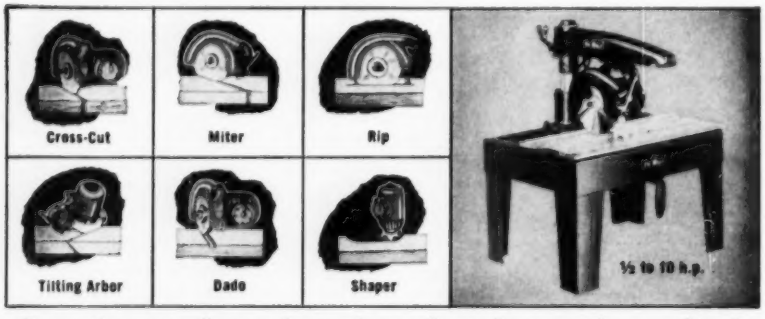

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Traveling Lube Rig Built to Your Needs

A mobile lubrication rig designed to the contractor's own specifications can be the most satisfactory piece of powered equipment on a busy construction job—and among the most valuable to keep production rolling.

Service requirements determine the layout of a lube rig. Here is a general guide when designing:

- After you know the types and kinds of oils and greases that must be used, consider your schedule of service. How many units at a time will you want to service?
- Determine the number and type of service hoses you will need. Specify a hose reel for each one.
- Select the pumps needed to supply lubricants to the reels. Generally, two high-pressure lube reels can be supplied by one high-pressure pump.

Lubricants and oils can be dispensed directly from original containers or from hoppers. Be sure to use a large air compressor, as all lube pumps are air-powered. A lot of air will be needed. If you are going to work nights, plan on a good lighting plant.

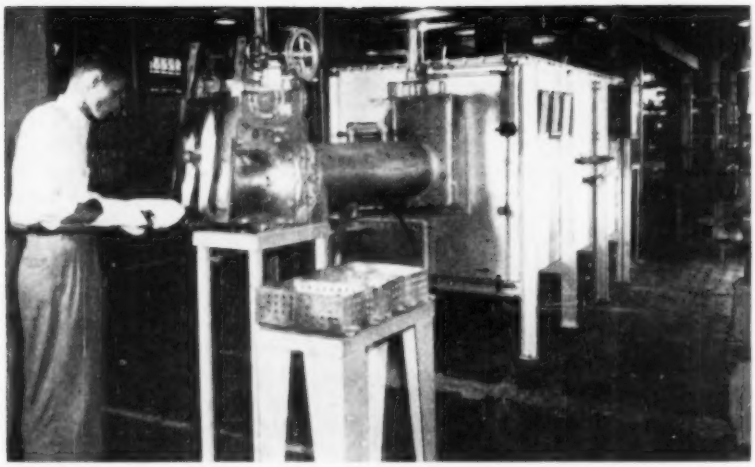
Then tailor the truck to fit your needs. This is done readily through the combining of individual components in multiples sufficient to serve the equipment in the field. —Const Meth & Equip, July, p162

"Airslide" Flour Trailer

A 33-ft. trailer built by Trailmobile for an Omaha, Nebraska, bakery uses new "airslide" principle as an aid to gravity in unloading unsacked flour.

Airslide equipment employs the action of compressed air to prevent flour from sticking to the hopper. Low-pressure compressed air seeps through ducts beneath the load into the flour. Because of the special characteristics of flour, the particles surround themselves with air and the flour flows like water down the trailer's inside walls.

Discharging of the 40,000-lb. load is done by a 225-ft. mechanical conveyor and takes about 4 hr.—Fleet Owner, July, p92



RETORT FURNACE with charging and discharging vestibules, heating chamber, and cooling chamber brazes high-strength alloys under dry hydrogen

Dry-Hydrogen Brazing . . .

. . . can join high-strength alloys successfully with no flux or oxidation problems. It permits the work to be done on a production rather than a manual basis

BRAZING HIGH-CHROMIUM and silicon steels by gas torch is a slow, costly job. Furnace brazing with a flux has been tried, but it merely reduced oxidation. Now, the use of a dry-hydrogen atmosphere in the furnace makes brazing practical, giving these advantages:

1. No flux is used.
2. Work comes from the furnace clean and bright, needs no further cleaning.
3. New alloys, and materials such as ceramics, can be brazed.
4. Trapped flux or corrosion by flux when parts are exposed to air cannot cause weak joints.
5. Complicated parts can be produced at reasonable cost.

Parts or assemblies to be brazed are cleaned, then placed in a perforated tray in the charging vestibule of a retort furnace. After this area is purged to avoid contamination of the hydrogen, the tray is moved into the heating chamber, left for a specified time, moved to the cooling area, and finally removed through the discharging vestibule.

The dry-hydrogen atmosphere in the furnace is produced by passing electrolytic hydrogen over a palladium-coated ceramic at room temperature. Oxygen in the hydrogen combines with hydrogen on the palladium surface to form water. The gas then passes through an activated alumina tower to remove the water and give a hydrogen of about −100° F. dewpoint. This low dewpoint and the use of a closed retort furnace maintain the brazing reaction always in the reducing direction.

Brazing materials may contain large percentages of such elements as chromium, silicon, boron, manganese, and titanium. Among the alloys with high manganese and nickel that have been used in dry-hydrogen brazing are 20% Mn-80% Ni, 40% Mn-60% Ni, and 60% Mn-40% Ni. The amount of manganese and nickel alloy must be determined carefully in brazing type 347 stainless steel as too great an alloying action can even produce holes in the steel sheet.

Several hard surfacing alloys have brazed stainless steel successfully and produced joints with high-temperature hardness. A typical alloy is 65-75% nickel, 13-20% chromium, 2.75-4.75% boron, and 10% maximum of iron, silicon, and carbon. It is available in powder form for brazing.

Other alloys include: 15% silicon, 2% boron, 83% nickel; copper alloys, such as 10% nickel, 5% iron, and 85% copper and 3% cobalt and 97% copper; silver alloys, such as 15% manganese and 85% silver and eutectic silver and copper.

With all these brazing alloys, joint design for dry-hydrogen brazing is about the same as in other controlled atmospheres, such as combusted gas, dissociated ammonia, and ordinary hydrogen. A primary requirement is that all joints be exposed to hydrogen circulation to insure wetting of the brazing material and clean bonds.

For an ordinary joint, where one part fits into another, the brazing alloy in wire form can be placed at the joint and the assembly sent through the furnace in upright position. Capillary action draws the melted alloy into the joint.

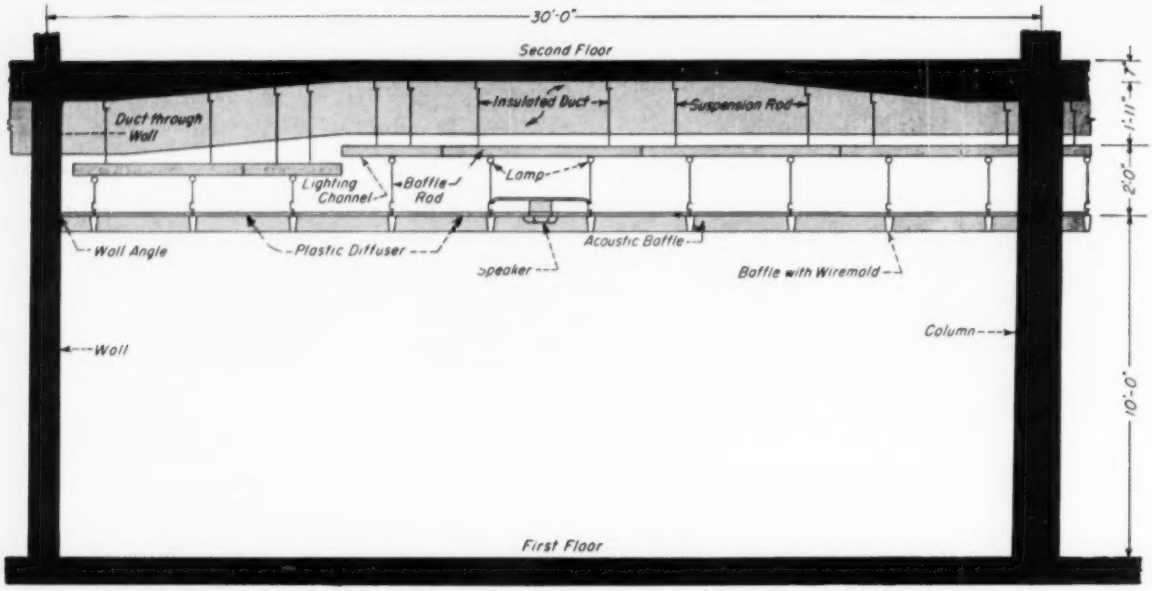
Some alloys are not ductile enough to be made into wire form. They can then be used as a powder mixed with alcohol to give a slurry or with a cellulose binder and painted on the joints.

To obtain continuous capillary action throughout a joint, it must have well fitting parts with square corners on both parts. Poor seating destroys the capillary action and reduces both brazed area and joint strength.

On high-tensile joints, clearances between members must be small—from 0.000 to 0.002 in. But a small clearance allows the brazing material to flow in a thin layer that alloys with the base metal, thereby raising its melting point and preventing it from flowing through the joint. In such cases, grooving the inside or outside member and inserting brazing wire in the grooves insure the liquid's filling the joint properly.

When joint strength is not so important, the clearance may be 0.0015 to 0.003 in. The larger gap restricts the alloying action, thereby decreasing joint strength. Maximum clearance is 0.004 in.

An important requirement is that mating members be held rigidly during heating. If parts cannot support themselves, they must be clamped or held together by some other means, such as tack welding, spot welding, pinning, or riveting.—Prod Eng, Aug, p156



SECTIONAL DRAWING shows how multipurpose ceiling conceals lighting channels, air ducts, loudspeakers.

Versatile Electric Ceilings

Multifunction electric ceilings without precedent feature new plant. They supply seven basic services—from light to noise, climate and fire control

MULTIFUNCTION electric ceilings that are without precedent are installed in a new two-story, $2-million Douglas Aircraft Co. factory in El Segundo, Calif.

Seven basic services are integrated into each ceiling unit. They are: (1) wall-to-wall translucent lighting; (2) acoustic baffles for noise control; (3) air diffusers for climatic control; (4) sprinkler heads for fire protection; (5) public address speakers; (6) provisions for carrying telephone cables to point of use; (7) power outlets in wireway sections of baffles.

The building, especially designed for a 1,500-man engineering team, is of steel and concrete and measures 210 x 330 ft. Centered on each floor are large open areas, each 210 ft. square, housing engineering and drafting areas. These two 44,100-sq. ft. areas and 13 private offices are equipped with the special electric ceilings.

Here are features of the seven basic services:

Lighting System—This consists of corrugated plastic diffusing panels supported on a structural framework, above which are installed lighting channel housings and assemblies that support and operate 96-in. 3500° K. standard white slimline fluorescent lamps on 36-in. centers. In all, there are 3,844 8-ft. lamps. They rest 2½ ft. below the concrete ceiling and 18 in. above the plastic ceiling, which is 10 ft. above the floor.

The two engineering rooms have the world's largest open-area translucent lighting: 2 acres of plastic panels using 5 miles of fluorescent tubing.

Initial lighting intensities averaged over 100 footcandles in private offices and about 135 footcandles in the large areas. Since the building is air conditioned, it is expected that in-service maintained lighting levels will be at

FINISHED CEILING is shown here. Note sprinklers in baffles and air diffusers near central column line. Telephone cables drop vertically.

least 75% of initial values. The lighting is exceptionally comfortable.

Sound Control—Acoustic baffles of perforated metal, packed with acoustical material, are used in the large areas. Six inches deep, they are supported from the lighting channel assemblies and spaced on 36-in. centers in one direction, 30-ft. centers in the other.

Besides standard types, there are two other special baffle designs. One contains 1½-in. dia. holes for telephone cable; the other has an electrical raceway bottom channel.

Climatic Control—An air distribution system provides climatic control throughout the building. It consists of 14 x 36-in. rectangular outlets spaced on 12 x 30-ft. centers in groups of two outlets end-to-end at each location. Thus there are about 600 air diffusers. They provide cool or warm air, and handle return air.

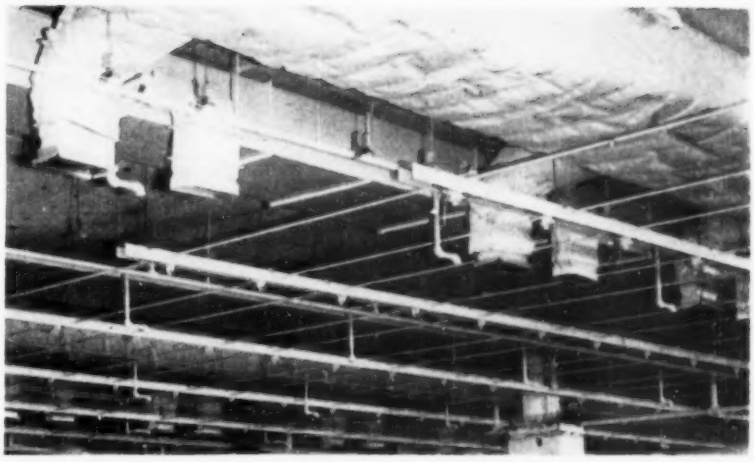
Fire Protection—Complete fire protection system includes main pipe 6 in. in dia., feeder and branch pipes, and 1,024 sprinkler heads located on 9 x 10-ft. centers. Sprinkler heads are built into the acoustic baffles.

Public Address System—This has 100 loudspeakers recessed into the luminous ceiling on 30 x 30-ft. centers.

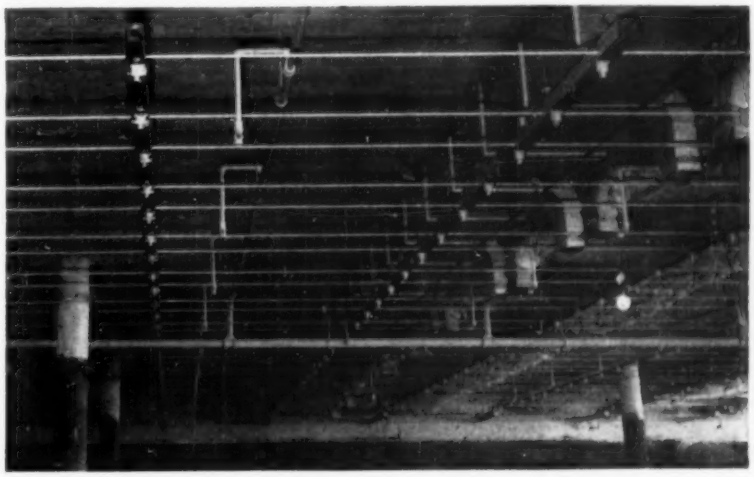
Telephone Cables—Telephone wires are run along the sides of the baffles in ivory cable. They drop vertically from the baffles to the desks below. Since the ivory cables blend in well with the white luminous ceiling background, they are not objectionable.

Power Service—Electric power at 120 volts is provided throughout from convenience receptacles in the electrical baffles. These are located on 9-ft. centers and carry receptacles along the bottom of each baffle on 6-ft. centers.

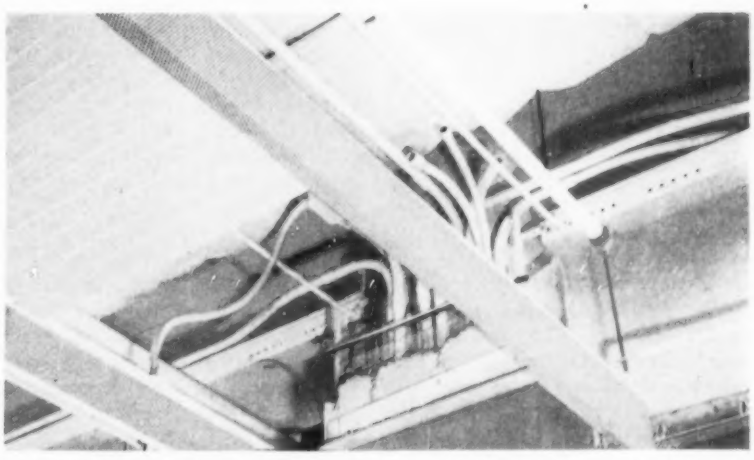
Douglas engineers feel that the excellent working environment supplied by the electric ceiling will keep employee morale and efficiency high, turnover low. The ceiling, together with baffles and all related elements, was manufactured for Douglas by the F. W. Wakefield Brass Co., Vermilion, Ohio.—Elec C&M, Aug, p63



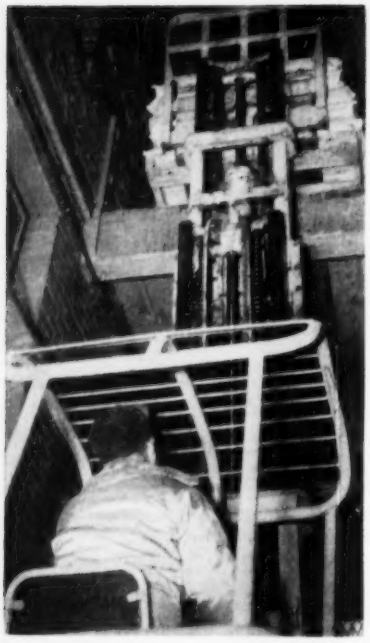
AIR DUCTS are attached directly to concrete ceiling. They supply air to 600 diffusers, change it completely 12 times hourly, and also handle return air.



FIRE-PROTECTION pipe taps off main feeder line (large pipe in picture) and supplies offsets connected with 1,024 sprinklers throughout the building.



POWER IS SUPPLIED to electrical baffles, installed on 9-ft. centers, through flexible cable between baffle and branch circuit outlet box at top of column.



Replaces Elevator

W. H. & L. D. Betz, Philadelphia water-treatment firm, formerly moved materials to its second floor in a 2,000-lb. elevator, which was poorly located at the rear of the building. That meant a long haul on both floors. The solution: a hole cut in the second floor at a handy spot and a Clark fork truck with double uprights. Fifty tons can be lifted in 3 hr. instead of a full day. —Chem Wk, July 24, p58

Film Study Aids Design

A Scottish firm of laundry engineers bases its machine design on film records. First, a film is made of an operator using a machine in her own manner. This film is then analyzed for time and motion studies.

The operational method is reorganized, and the operator trained in the new method. Another film is made and studied before actual design of the new machine begins. It can be scanned as often as necessary by the designers. It also allows accurate timing of operations.

This approach reverses the normal practice of building a machine and then training an operator to make fullest use of it. It eliminates potential problems at the beginning, not when the finished machine goes into production.—Mach, July 24, p1305

Office Duplicating . . .

Which Process For You?

Each duplicating process answers some particular problem. Needs of the individual office determine choice of one method over another

MODERN BUSINESS demands more and more copies of letters, forms, reports, brochures. The manufacturers of duplicating equipment are busy developing new reproduction methods and machines. So it's no easy task to decide which process is best for you.

To help you make that decision, here is a discussion of the major processes, with advantages and limitations of each, and how you can make them work for you.

1. Stencil Duplicating—This is perhaps the most familiar reproduction method. After the stencil sheet is prepared by typewriter or stylus, it is placed on a rotating inked cylinder. Openings in the stencil coating allow the ink to seep through in just the right quantity to leave the desired impression on the paper passing beneath the cylinder.

2. Hectograph Duplicating—An aniline dye deposit is made by typewriter, pencil, or stylus on a paper master. The deposit may be made on the face of the master by typewriter ribbon and transferred to a gelatin-coated roll. Copies are made by direct contact between copy sheet and roller. The deposit may also be made on the reverse side of the master and transferred by bringing it into direct contact with a spirit-moistened copy sheet. This process is particularly adaptable to color.

3. Photocopy Printing — The material to be copied is photographed in direct contact with a sensitized photographic paper. It is especially useful for a small number of copies. The sensitized paper, once exposed, is rapidly developed chemically, and an exact duplicate of the original obtained.

4. Direct-Process Printing — For most offices, this process is limited to whiteprint or diazo duplicating. It has many applications where a relatively small number of copies is required. Translucent paper stock is normally used as the master and the diazo-coated copy paper, after being exposed under a high-intensity mercury vapor lamp, is developed in an ammonia vapor or by a liquid developing agent.

5. Offset Printing—This is a commercial printing method adapted to office needs. Masters, or plates, are made of specially-coated paper, plastic, or metal. They may be prepared by direct typewriting, drawing, or by several variations of the photographic process. Once the plate is put on the machine, it passes over rollers lightly coated with ink and water. The ink, which adheres to the printing on the plate, is transferred to a rotating rubber blank that, in turn, "offsets" onto the copy paper.

Most office managers have no need for all five of these duplicating methods, but must content themselves with one or two. But which one or two? One way to answer this question is to create a hypothetical office manager and an equally hypothetical duplicating problem. Let's call him Mr. Jones, and let's assume that his company is opening a new sales and service branch office. Mr. Jones is directed to study the matter of duplicating equipment for the new office.

His problem is to determine what the duplicating needs of the new office will be and how they may best be filled. First he must know something about his load factor. It involves not only the total amount of work to be done each day, but also the number and type of specific jobs to be done. By making inquiries Mr. Jones discovers that the new office will have a reproduction "base load" of 10,000 copies a day.

He also finds that one of the

duplicating jobs he will have on a given day will be to reproduce 5,000 copies of a form for the service manager. But, on the next day, he will be called on to duplicate several hundred copies of 50 different jobs—letters, price lists, and bulletins for the sales manager. On another day, one of his problems will be to make 10 copies of several-hundred different engineering tracings for the service department.

Because of this particular load factor, Mr. Jones must provide duplicating processes that are economically sound for long-, medium-, and short-run reproduction. (A short run is 20 copies or less; a medium run from 20 to 500 copies; and a long run, above 500 copies.) The method that is best suited for reproducing 5,000 copies of that form is not the most economical for obtaining 10 copies of engineering drawings.

After some study, Mr. Jones finds that long-run work should be done by either stencil duplicating or by offset. The short-run work, he discovers, could best be done by photocopy or by whiteprint duplicating. When it comes to his medium-run work, he learns that hectograph, stencil duplicating, and offset all offer good possibilities for economic reproduction.

Mr. Jones will now have to think about the quality of the work to be done. Quality will depend on the degree of complexity of the finished work and the level of its distribution.

When he begins his quality analysis, Mr. Jones finds that the form for the service manager is a two-sided job and that the servicemen will have to write on both sides in ink. Here is a complexity that can best be handled by offset.

Mr. Jones' survey also uncovers the fact that the new office will also require a number of one-sided forms, to be filled in by pencil, with quantities ranging from 250 to 1,000. Here, he decides, will be work suited to stencil duplicating.

When he finds that some of the sales material will require halftone reproductions, Mr. Jones is certain that he will have to have an offset duplicator in his battery of reproduction equipment. The sales manager would "like some color" in his bulletins. He also requires that these copies be reproduced quickly and inexpensively. Mr. Jones learns that all these requirements, particularly that of color, are well done on the spirit hectograph process.

When he looks into his short-run duplicating problem—principally the drawings for the service department—Mr. Jones discovers that he will have to reproduce copies of drawings up to 34x22 in.

Had Mr. Jones' short-run work been confined to standard letter or legal sizes, he might have selected a photocopy machine. Some photocopy machines are capable of enlargements and reductions, but the large-size drawings to be reproduced would seem to call for the diazo process of whiteprint duplicating

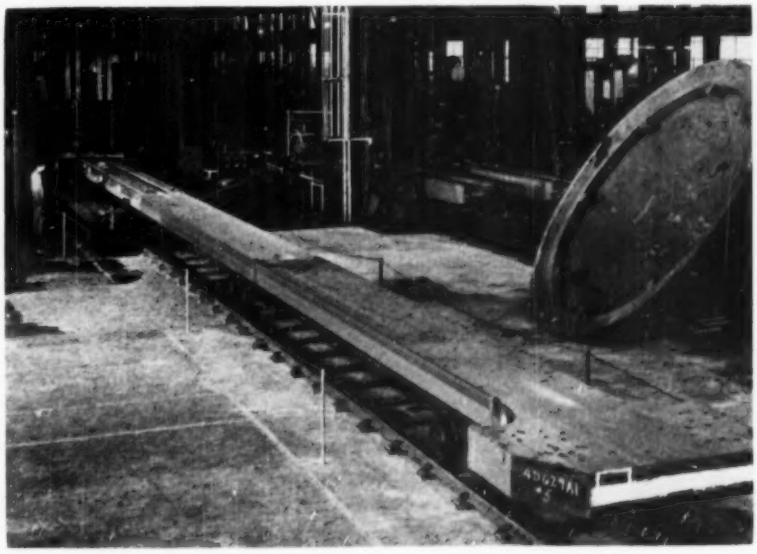
Then Mr. Jones can get down to cost studies—initial costs and operating costs. Initial costs will include not only equipment costs but installation costs.

Under operating costs, he must allow for floor space, depreciation, superintendence and plate-making. These are fixed. Variable operating costs include operators' time and the supplies necessary to turn out the expected number of copies.

Two other costs remain to be studied—preparatory costs and production costs. Generally, processes that have low preparatory cost have high per-copy cost. Processes that have high preparatory costs have a low per-copy cost. Once Mr. Jones assembles his cost-per-copy figures he can chart a break-even point on the number of copies to be run on a given machine.

If this were all the information Mr. Jones needed, he could decide on what machines to buy. But there are other factors. Each office manager must evaluate his own specific and individual cost elements before he can arrive at a well-reasoned and reliable estimate.

Our discussion of the hypothetical Mr. Jones and his problem can provide the framework for a deeper analysis. And it shows that cost—whether initial or operating—cannot be the only determinative in purchasing the proper duplicating equipment.—Am Business, July, p27



Buggies "Stretch" Large Planer Capacity

Forging for 35,000-ton forging press was so large—101 ft. long and 200 tons in weight—that no planer at Bethlehem Steel Co. could handle it. So tool engineers devised buggies to support overhanging ends when the forging was clamped on the 40-ft.-long planer table. Buggies travel on 176-ft.-long railroad tracks that pass under the planer table and are grouted into the concrete floor. Track extends 70 ft. at each end. Table travel is 36 ft. so machining is done in three stages.—Am Mach, July 19, p117

Heavier feeds...
Deeper cuts...
DOUBLE OUTPUT

DELORO STELLITE Grade 100 cutting tools, because they do not burn even when red hot, permit heavier feeds — deeper cuts. This reduces machining time, in many instances doubling and tripling production.

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Eight Ways To Reduce Construction Costs

Plant management can do a lot to keep construction costs of new plants or additions down to where they should be. These eight tips will help:

1. Don't start the job too soon. Once ground is broken, overhead costs continue relentlessly until the job is done.

2. Don't avoid the contractor's chain of command. Use regular channels to keep efficiency up.

3. Keep everyone in your organization informed and have them make desirable changes before, not after, erection. Late changes cost plenty.

4. Be sure that the exact nature of the job is described as completely as possible in the contract and specifications. Try to cover all work in the first bid.

5. Don't overdo or underdo safety and cleanup programs. Intelligent administration can cut both insurance and construction costs.

6. Keep moving. Indecision and delays are costly.

7. Make sure that field changes are engineered to completion. If you are going to pay for a change, you might as well get it right.

8. Don't order "rush jobs" if you can avoid it.—Pet Proc, Aug, p1212

Conveyor Resonance

Vibration may be an undesirable nuisance in many kinds of industrial equipment. But Stephens-Adamson Mfg. Co., Aurora, Ill., has even added to it in a new natural-frequency conveyor by putting resonance to work.

The conveyor is mounted on coil springs, all set at an angle to the direction of flow. The springs operate alternately in compression and tension and at their natural frequency, or resonance. Thus, power absorbed by the springs is regenerated at the end of each stroke and serves to start another. With the springs at an angle, the horizontal component of the force gives the material a constant forward flow.

Advantages of the design are lower power needs, simple construction, minimum of vibration (which is self-balanced within the unit). —Prod Eng, Aug, p15

International Business Briefs

Paris—French, German, Belgian and Italian capital is combining to build a new 100,000-ton capacity fertilizer plant at Colomb-Bechar, southern Algeria. Participants include: Air Liquide, German Indufina, and the Baillencourt-Coppet group (Belgian subsidiary of Italy's Montecatini company).

New Delhi—Following Lederle (1952) and Squibbs (1953), Parke Davis is the latest U. S. pharmaceutical maker to start manufacturing in India. Chief product of its Bombay plant will be chloromycetin. . . . A German firm, Baresel and Kuns, has won an Indian government $778,400 contract to build the first stage of the 7,250-ft.-high Banihal Tunnel, providing an all-weather road to the Kashmir valley.

Milan—Societa Anonima Elettrificazione, trade association of leading Italian electrical-equipment makers, is building $13-million worth of projects in Australia, including power lines, an airport, and two giant wheat silos. Fifty per cent of the material is Italian.

Buenos Aires—Bayer A. G. of West Germany and Cia. Quimica, S. A., will build a $650,000 plant in Argentina to produce Bayer-licensed anilines and dyes. Profits will be split 45% to Bayer, 55% to Quimica.

Geneva—Escher-Wyss, Zurich, are building what they believe to be the world's largest pumps: two 83,000-hp. accumulation pumps for the Austrian hydro-electric plant, Tauern Kraftwerke, Zell am See.

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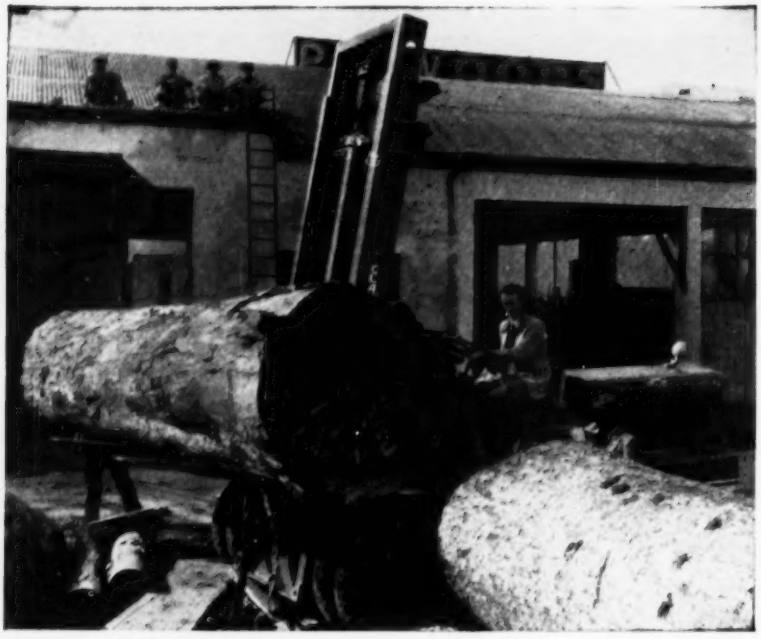

Plywoods, Ltd., doubles storage capacity, speeds log-hauling, with one Clark 15,000 lb. truck

How to handle huge logs (and large bundles of timber)—a basic problem in Plywoods, Ltd.'s (Parow, C.P. South Africa) twenty-acre plant—was quickly and profitably solved by installation of one Clark Yardlift "150."

This pneumatic-tired giant of 15,000 pounds capacity, picks up three bundles of cut timber as one load; and stacks them six-high instead of three-high, the former limit. This practically doubles capacity. Also the Clark machine handles with ease enormous logs weighing up to 7½ tons, a fact that makes unimportant the distances logs must be transported. As a result the yard arrangement has been greatly improved.

Easy maneuverability of the Clark truck has made it practical to reduce aisle widths, effecting further space economies. Also, the truck's hydraulic steering makes the driver's task easy—in spite of enormous tonnages handled.

Plywoods Limited, is thoroughly satisfied with its Clark truck. Throughout the world alert businesses of every kind are winning victories against rising costs by means of Clark machines. To discover how you may enjoy similar benefits, consult the Clark distributor.

CLARK EQUIPMENT

EXPORT DIVISION
CLARK EQUIPMENT COMPANY
Battle Creek 73, Michigan, U. S. A.

Remote Recorder Checks Screw-Machine Downtime

Here is a setup that will tell you what your machines are doing. Waltham Screw Co. has a continuous recorder that shows a supervisor in a second-floor office the condition of his screw machines.

An Alden Multi-Channel Recorder in the production supervisor's office gives him a visual check on operation of each of 30 automatic screw machines. He knows immediately when a machine is down. Result is no time wasted in ordering repairs. Expected production boost is at least 10%.

A switch on each screw machine completes a circuit to the recorder whenever a spindle is indexed. Electrical impulses make distinctive patterns on paper running through the recorder. The patterns show whether a machine is shut down, operating normally, being adjusted, or being stocked.—Factory, July, p93

New Fertilizer Process

A novel two-stage crystallization process produces ammonium nitrate at the plant of Aburdarverksmidjan H.F., near Reykjavik, Iceland. This is Iceland's first venture into chemical manufacturing.

Nitric acid is reacted with ammonia dissolved in recirculated mother liquor from a crystallizer. (Both nitric acid and ammonia are made at the plant.) The reaction provides enough heat to evaporate the water introduced by the 60% nitric acid.

Liquor containing the reaction product passes to a surge tank to neutralize free acid, then to the crystallizer as a warm unsaturated solution at 125° F. Cooling under vacuum crystallizes out ammonium nitrate, which is discharged in a stream of liquor to a conical crystal feeder and centrifugal. Undersized crystals are retained in the process for further growth as the mother liquor is recycled to the ammonia absorber.

Centrifuged crystals are dried, then coated with diatomaceous earth. The coated crystalline product contains 33% nitrogen.—Chem Eng, Aug, p190

Mr. Transport Chief—

the DAGENHAM BUILT 4-cyl. DIESEL TRUCK engine IS AN INSTANT SUCCESS!

Never before has a Diesel alternative been offered at such a low price—nor has a truck met with such instant success!

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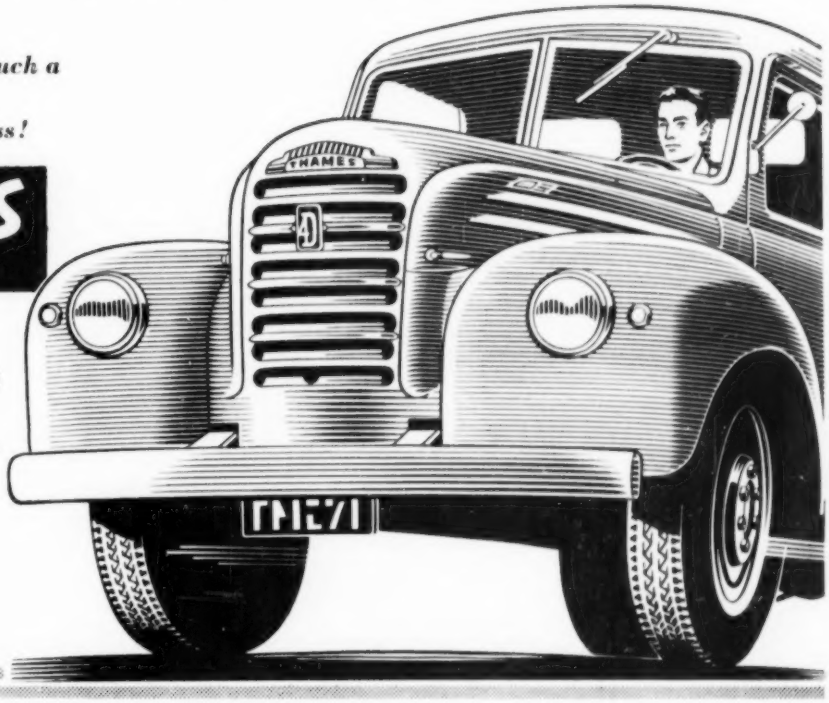
now available fitted with the new Dagenham Built 4-cyl. Diesel Engine, are the finest business proposition of their kind anywhere —see your Ford Dealer now!



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Why all the talk about vacuum melting?

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Aluminum	Tensile strength	Automobile valve springs
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Copper	Ductility	Jet turbine buckets
Chromium	Fatigue life	Structural elements in nuclear power plants
Germanium		Tool steels
Iron	. . . and you get new alloys that could not be produced in any other way	Transistors
Magnesium		Vacuum tubes
Molybdenum		Watch springs
Nickel		
Titanium		
Zirconium		

Brewing Alloys in a Vacuum

PUT A METAL IN A VACUUM, heat it until it boils, and wonderful new things start happening to it. It loses impurities. It doesn't collect a layer of slag on its molten surface. And when it is poured and cast—still in its vacuum—it becomes an ingot worth perhaps four times as much as conventionally melted metal.

The chart above tells a little about vacuum-melted metals and why they are suddenly so popular. The big reason is performance. A vacuum-melted ball bearing practically refuses to wear out. Vacuum-melted copper in an electronic tube will work well at very high temperatures; conventional copper will not.

A boom in production is about to take place in vacuum-melted metals as modern industries demand even greater quantities of superior metals and alloys. Production, now only 30 tons monthly, will probably be more than ten times that—perhaps 400 tons monthly—by mid-1955. Here are expansion plans of the two chief U. S. producers.

Vacuum Metals Corp., Syracuse, N. Y., is now producing between 15 and 20 tons monthly. By year's end, its new 1-ton vacuum furnace, the world's biggest, will be in operation, raising output to 80 tons monthly.

Utica Drop Forge & Tool Corp., Utica, N. Y., expects to raise output some ten times by 1955—from 15 to 160 tons monthly, using two new 1,000-lb. furnaces.

The General Electric Co., a small-scale producer of vacuum-melted metals since 1946, is now installing a 400-lb. furnace at Schenectady with a capacity of 50 tons yearly. Most of its output will go to GE's aircraft gas turbine division. Westinghouse's new metals plant at Blairsville, Pa., will have a 1,000-lb. vacuum furnace. It will produce some of the new alloys so vital in the nuclear power field.

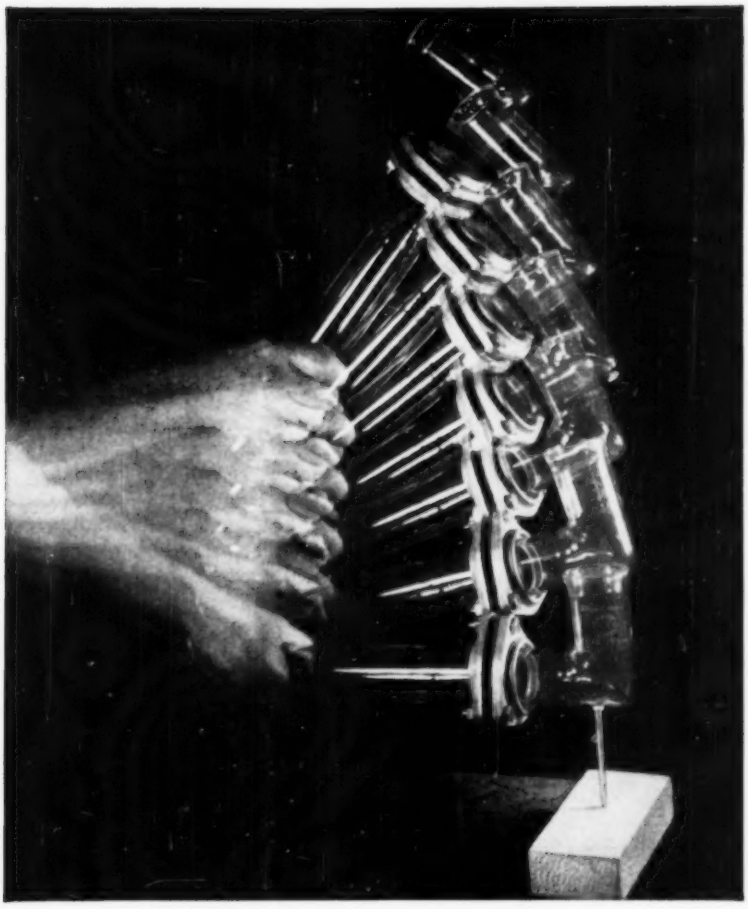
Titanium Metals Corp. is expanding vacuum-furnace capacity after perfecting a process that permits removal of hydrogen from titanium to as low as 50 parts per million.

The great advantage of the vacuum furnace is its elimination of impurities. In a conventional electric-arc furnace, some metals react with elements around them. They will react with oxygen and nitrogen, for instance, to form oxides and nitrides. These show up as slag on top of the molten metal. When the metal is poured, this slag can be pulled off. But there is always a certain amount of impurity locked into the ingot. At very high temperatures, it may cause the metal to break down.

In a vacuum furnace, on the other hand, such impurities never have a chance to form, because there is no oxygen or nitrogen to react with. It has all been pumped out.

The greatest demand for vacuum-melted metals at present is in the aircraft and electronics industries, and for special tool steels. But other, more everyday applications are also showing up.

The Ford Motor Co., for instance, has discovered that exhaust-valve springs, made of vacuum-produced metal have two advantages. They use less metal; and they are quicker to react, which means that the horsepower of the engine is increased.—Business Wk, Aug 7, p110; Chem Eng, Aug, p112



This *glass* drives home a point ... *it's strong*

SURE, it's easier to drive a nail with a hammer. But, the point is—*glass can be made strong enough to stand such a blow.*

This characteristic of Corning brand glass No. 7740 makes it practical for pipelines, sight glasses, mixer bowls, explosion-proof globes and other products that must withstand pressure or mechanical shock.

Physical strength is just one property Corning can build into glass. There are many others that make its application to design problems practically unlimited. For example, glass can be made to withstand temperature extremes, conduct or insulate electrical charges, control light, repel corrosion, or give you new "eyes" through its optical properties. In short, glass by Corning is a *new* engineering material. We suggest that you send for the illustrated bulletin on "Glass, its increasing importance in product design." Just mail the coupon.

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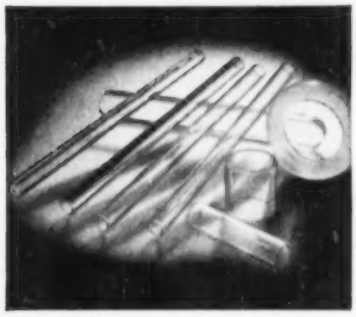
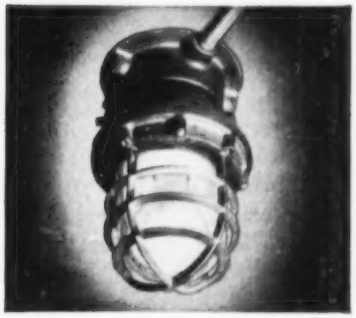


Made to withstand various boiler pressures up to 2000 psi., Macbeth and Corning brand gauge glasses illustrate the ruggedness Corning builds into glass.



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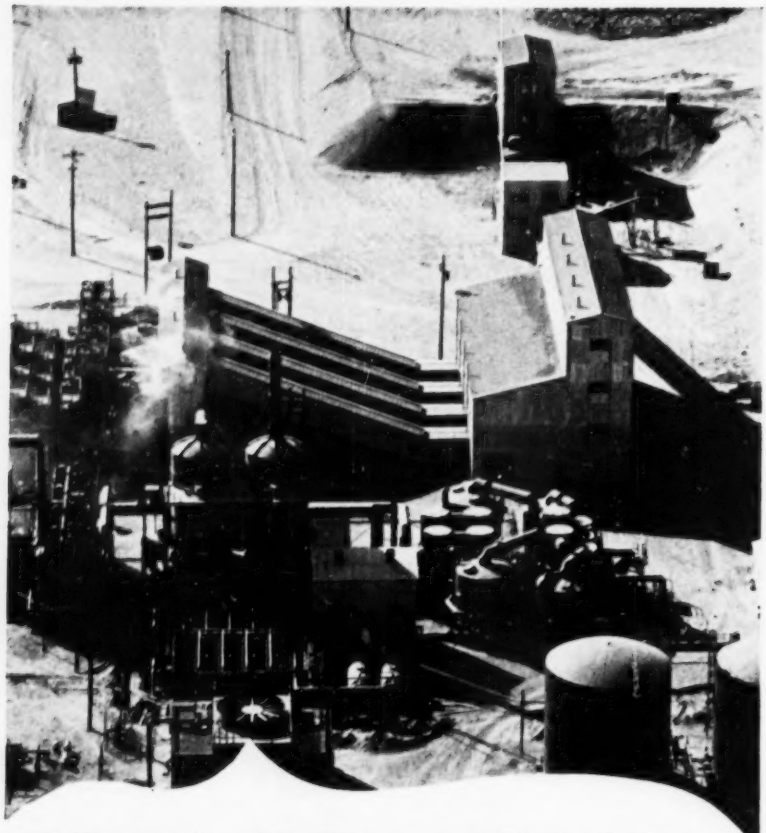

Here's A New Wrinkle In The Sulfur Picture . . .

Leaching 11,000 tons of copper ore a day requires plenty of sulfuric acid. At Weed Heights, Nevada, Anaconda Copper Company is producing 450 tons of it daily . . . from a raw material previously considered useless! The material — low grade ore containing 25-30% elemental sulfur. The process — a Dorrco FluoSolids System which delivers 26,000 to 30,000 CFM of SO_2 gas to a contact acid plant. And the net result — a low grade and heretofore uneconomical source of sulfur has been made available for utilization on a world-wide basis.

If you have a problem involving fluidizing techniques, the separation of finely divided solids in suspension, or the use of ion-exchange, the chances are that Dorr and its Associated Companies throughout the world can be of service to you.

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Three-Process Plant

New ammonia and urea plant being built by Deere & Co. at Pryor, Oklahoma, will combine three processes:

1. **Partial oxidation** of natural gas with oxygen to prepare synthesis gas. Process advantages, according to the designer, Foster Wheeler Co., are flexibility, possible substitution of fuel-oil feed for natural gas, simple maintenance. Gas is then stripped of carbon monoxide and given a nitrogen wash.

2. **Casale process** for ammonia synthesis. Use of this process, new in the U.S., will allow Deere to get by with water cooling for ammonia condensation and will eliminate auxiliary refrigeration required at lower pressures. The Casale process uses high pressures—9,000 to 12,000 lb. per sq. in.

3. **Pechiney process** to make urea. This is a two-stage operation: formation of ammonium carbamate and conversion of part of the carbamate to urea.—Oil & Gas J, Aug 2, p78

Electronics Briefs

▶ New silicon rectifier developed by Westinghouse Electric Corp. has power output exceeding 1,200 watts, compared with a fraction of a watt in previous silicon diodes. The semiconductor device, about half the size of a cigarette pack, will function at temperatures up to 392° F.—p5

▶ Two new small electrostatic air cleaners have been developed for home use. A Raytheon unit ionizes air in a nonuniform electrostatic field. Then the charged dust particles are acted upon by a uniform electrostatic field between two closely spaced collector plates and are deposited on electrodes of opposite polarity. A Radex unit pulls particles to oppositely charged plates.—Electronics, Aug, p6

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World Technical Trends

▶ **London**—The projected 2,000-mile-long trans-Atlantic telephone cable (a unique job since maximum underwater telephone cable length thus far is 200 miles) calls for such special characteristics that Submarine Cables Ltd., is building a special factory at Erith to handle the $36-million project. Cable will have 52 repeaters containing 300 radio tubes. For protection, its dimensions must be closely controlled.

▶ **Vienna**—Wiener Lokomotivfabrik has built a high-pressure steam-storage shunting locomotive that produces no steam itself but "tanks up" instead from a high-pressure boiler. Engine cuts maintenance costs by two-thirds, fuel bills in half. Also, it can be run by one man, is smokeless, and uses steam from low-grade coal (a similar engine was built by Henschel A. G. at Kassel for the Farbwerke Hoechst company, West Germany).

▶ **Melbourne**—A new Australian device reveals the quantity of unmillable material in wheat. Its main feature is a 1‡-in.-deep metal tray with bottom of steel bars 2 mm. apart. Waste material passes between these bars when the tray is agitated by a handle. It is then weighed against metal strips representing predetermined percentages of wheat waste, giving quick measure of foreign matter.

Plastic-Mass Tooling

A novel development of Russian engineers is to transmit pressure, for clamping workpieces in jigs and fixtures and for actuating punches, by means of a plastic mass. It behaves somewhat like an incompressible liquid.

The plastic mass is prepared by mixing 100 parts of polyvinyl chloride, 290 parts of dibutylphthalate, 100 parts of "vacuum" oil, and 4 parts of calcium stearate. It is heated before charging into a fixture.

Its use can simplify dies. For example, auxiliary punches set at an angle can make a die complicated and unreliable. But a plastic mass can actuate such punches without trouble. Mechanical efficiency is about 80%.—Am Mach, June 21, p126

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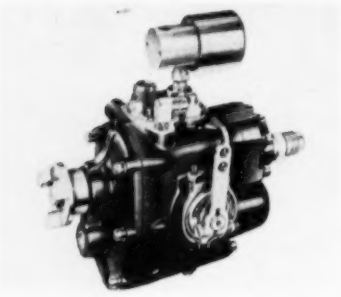
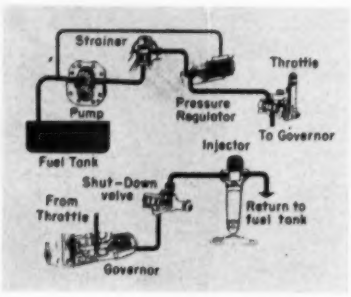
NEW PRODUCTS

New Fuel System



How It Works



Diesel Fuel System Cuts Overhaul Costs, Simplifies Fuel Injection In Diesel Engines

A new and greatly simplified diesel fuel system makes diesel-fuel injection as simple as gasoline-engine carburetion and ignition systems.

This new system, designated Cummins PT Fuel Injection System, completely eliminates fuel-rack adjustments, high- and low-pressure check valves, spring-loaded needle valves, helixes, distributor discs, metering pumps, high-pressure fuel lines, and the necessity for timing the fuel pump to the engine. The new system is now standard equipment on all models of Cummins diesel engines and can be applied to all Cummins diesels built since 1932, thus permitting older engines to be completely modernized.

The new PT Fuel System eliminates the complication of the diesel-fuel injection systems, thus simplifying servicing problems and reducing diesel-engine maintenance and overhaul costs.

A fixed orifice with a variable fuel oil pressure behind it simplifies the entire fuel injection system. The metering orifice is now a part of the fuel injector located in the cylinder head, thus adding the metering function to the injector. The injector now serves the dual purpose of metering and injecting the fuel. With the metering function now in the injector, the fuel pump is simply a source of fuel pressure with a pressure regulator, throttle control, governor control, and "start-stop" control serving to restrict the flow of fuel and so varying the fuel pressure at the metering orifice.

Injector plungers are operated from lobes on the main engine camshaft and control the timing of the engine. Because the timing is controlled by the engine camshaft, the PT Fuel System need not be timed to the engine.

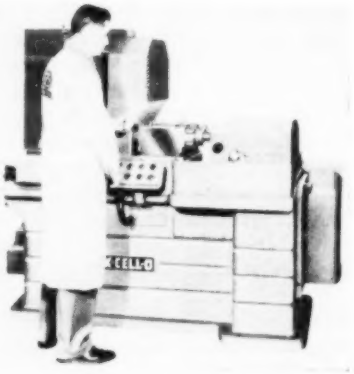
Briefly, the new Cummins PT Fuel System operates as follows: A gear pump picks up the fuel from the fuel tank, creating the basic fuel pressure for the system. This pressure is then controlled by a pressure regulator which is designed to control the maximum pressure in the system and give the proper torque and horsepower characteristics. The fuel pressure from this regulator is controlled by a throttle control valve, a governor control valve, and an "on and off" shutdown valve.

From this point the fuel flows from the fuel pump to a common manifold leading to each of the injectors located in the engine cylinder head. The pressure from the fuel pump is applied to the metering orifice in the injectors, and depending upon the pressure in the manifold, more or less fuel is metered through the orifice into the injector cup in the top of the engine combustion chamber. At the proper time for firing, the injector plunger is forced down by the action of a cam on the main engine camshaft, forcing the metered fuel through the spray holes in the injector cup.—**Cummins Engine Co., Inc., Columbus, Ind.**

Utility Air Compressor

Space conserving features of 105 cu. ft. per min. Utility air compressor make it ideal for mounting crosswise behind a truck cab, allowing extra room for load.

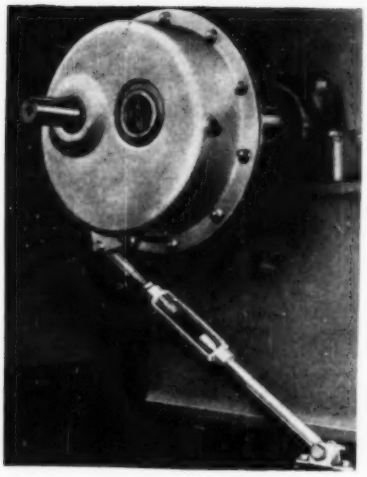
A lifting eye in the center of the hood top makes it easy to move the unit from the truck and back again. It also simplifies moving compressor from level to level on an erecting job.—**Le Roi Co., 1706 S. 68th St., Milwaukee 14, Wis.**



Precision Boring Machine

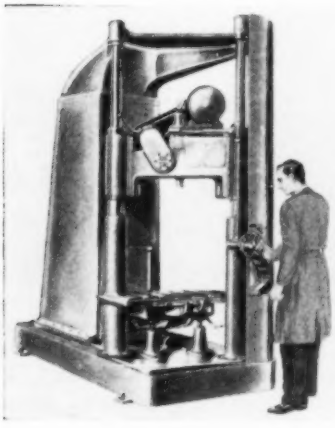
Style 312, a cam-operated boring machine, is designed for precision finishing work such as contouring, boring, turning, facing, and grooving. Cam followers impart cam movement directly to the machine table and cross-slide.

The machine is recommended for production contouring of work, in which forms must be reproduced within close tolerances. Contour form is obtained by longitudinal table movement coordinated with lateral cross-slide movement. Work is inspected by checking one dimension only.—**Ex-Cell-O Corp., Detroit 32, Mich.**



Shaft-Mounted Drive

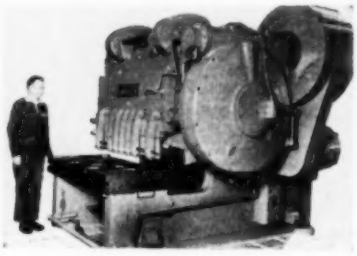
New all-steel speed reducer mounts directly on the shaft to be driven and requires no floor space other than that needed for the motor and tie rod connection. It is easily adapted to fit various driven-shaft diameters. Choice of single- or double-reduction unit permits almost any output speed between 420 and 14 rpm. merely by changing sheave sizes within allowable limits. Six sizes range from ½ to 30 hp. — **Falk Corp., Milwaukee, Wis.**



General-Purpose Hone

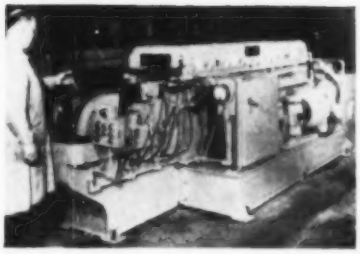
New general-purpose honing maching handles work from 1½ to 6 in. in dia. and up to 26 in. long. The machine is only 124 in. high and 48 in. wide. It is adaptable to a multiple-spindle machine and with automatic sizing.

The machine is being built in England on a licensing basis. It was shown for the first time at the recent European Machine Tool Show in Milan; price is competitive with European machines in the same field.—**Micromatic Hone Corp., 8100 Schoolcraft, Detroit 4, Mich.**



Shear Cuts 1½-In. Steel

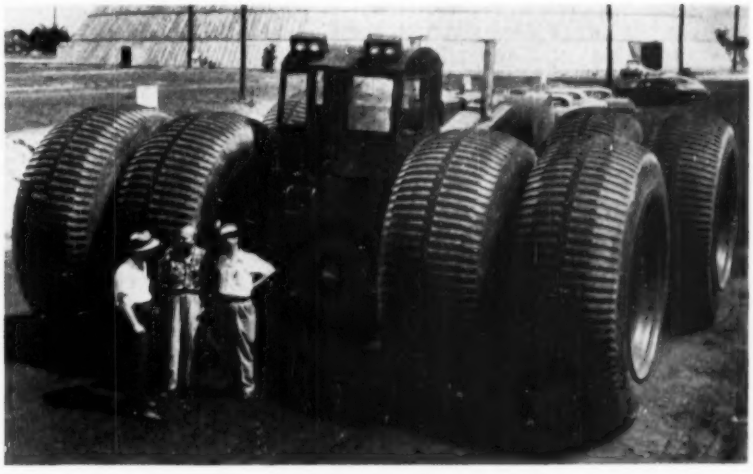
Features of a new shear include: front-controlled, power-operated back gage; worm-gear drive; multiple drive clutch; hydraulic hold-downs; light-beam shearing gage; ball transfers in table for easy feeding of heavy sheet. The shear is made of rolled plate steel. Shearing capacity is 1½-in. mild steel 4 ft. long.—**Cincinnati Shaper Co., Cincinnati 25, Ohio.**



New Machine Broaches 1,800 Parts per Hour

Horizontal, continuous broaching machine can broach sides, face, and half-round of an automobile connecting rod at a rate of 1,800 per hr. Stock removal is about ⅛ in. per surface. A series of individual, self-operating, self-locating and self-clamping fixtures hold the rods during the broaching operation.

The machine, powered by a 30-hp. motor, has a 120-in. stroke. A drive chain carries workpieces by the stationary broaches. A broach-carrying bridge, hinged on pivots on top of the machine, swings open for changing broaches. A conveyor attachment removes chips. — **Lapointe Machine Tool Co., Hudson, Mass.**



Snow, Swamp, and Desert Bow to the Sno-Buggy

The world's largest rubber tires are ready to roll over snow, sand, in fact nearly anywhere that you cannot drive an ordinary land vehicle, propel a boat, or land an airplane. Exploration, trail blazing, transportation of personnel and supplies, perhaps rescue missions will be the Sno-buggy's chief uses. Tires, 10 ft. high and 4 ft. wide, are mounted dual-fashion on four LeTourneau Electric Wheels, each with a built-in electric drive motor. Power is supplied from a 400-hp. engine and generator. Sno-Buggy width is 24 ft., length 27½ ft., ground clearance 3½ ft., speed 8 miles per hr.—R. G. Le Tourneau, Inc., 2418 S. MacArthur, Longview, Texas.

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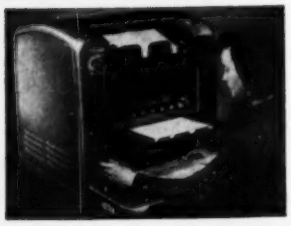

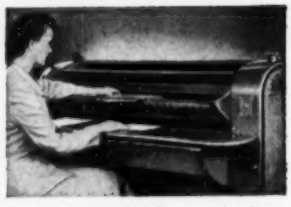

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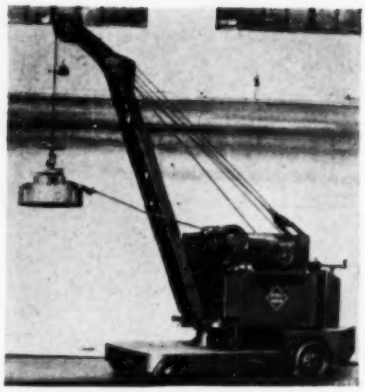
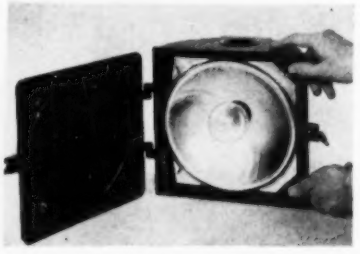


New Crane Truck

New 6,000-lb. capacity crane truck is designed for transporting long, hard-to-manage loads in confined areas, and to reach into normally inaccessible areas.

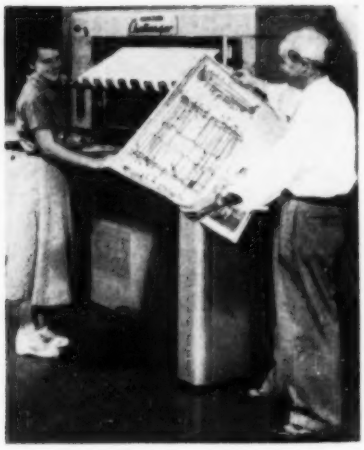
The crane is designed with a swinging action to facilitate handling on either side of the travel area without additional movement.

The boom is telescoping, with built-up heavy channel, and features a rigidly reinforced box type construction with ample bracing. The boom, in a telescoped position, measures 12 ft., 6 in.; extended, the boom measures 19 ft., 2 in. Boom lengths may be varied to suit specific operating requirements.—**Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.**



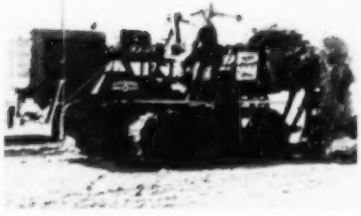
Adjustable Traffic Signal

Reduction of "sun phantom", a condition whereby reflection from the sun causes a signal unit to appear lighted, features the above new adjustable traffic signal. Its completely redesigned optical assembly consists of a socket and lens and a precision-formed anodized-aluminum reflector. Fixed-focus socket may be rotated manually.—**International General Electric Co., 570 Lexington Ave., New York, N. Y.**



Automatic Whiteprinter

Low-cost, fully automatic Challenger whiteprinting machine features "one-step" feeding and high-speed production, with printer and developer synchronized to a maximum of 40 ft. per min. At this speed, it returns an 8½ x 11 in. tracing to the operator in 2½ sec. and the finished whiteprint in 6½ sec. — **C. F. Pease Co., 3952 N. Rockwell St., Chicago 18, Ill.**

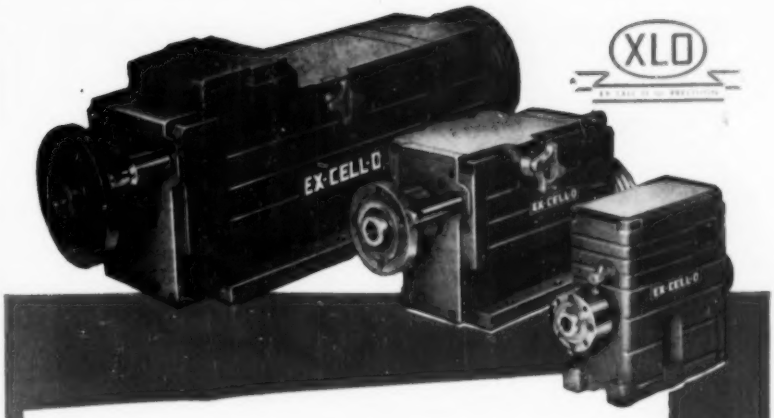


Heavy-Duty Trencher

Trenching machine for pipelines and similar heavy-construction jobs, designated Model 240, is a full-crawler-mounted, wheel-type trencher which digs up to 36 in. wide.

It has a low ground bearing pressure of 6.3 lb. per sq. in. and is balanced at the center of its crawlers. This enables the 240 to work effectively in the wettest rights-of-way and overcome the toughest hills.

Three optional bucket sizes give the 240 a trench width range from 20 to 36 in. Maximum trench depth is 6 ft., 3 in.—**Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio.**



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Ex-Cell-O Power Units feed or rotate tools in easily controlled automatic cycles. A single tool can be held in the unit spindle or a multiple head can be bolted to the quill flange. The Units are used in low-cost, high-production machines for such operations as drilling, reaming, counterboring and spotfacing. A typical machine consists essentially of a plain base, a work-holding fixture and one or more power units.

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Ex-Cell-O styles 28-A, 21, and 20 Quill-Type Hydraulic Power Units are shown above. They are standard models. Send for *all* the facts about them. Write or cable Ex-Cell-O for Bulletin 45828.

53-34

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NEW PRODUCT BRIEFS

Electric "Totemaster"—Model J battery-powered pick-up "Totemaster" truck carries up to 1 ton at 5 to 6 miles per hr. Designed especially for interplant movements, it is 107½ in. long, 40 in. wide and has a 15-sq. ft. deck area. It can be equipped with four air cushion seats for plant tours.—**Lewis-Shepard Products Inc., Watertown, Mass.**

Vibratory Parts Feeders—Small parts of nearly any shape or material can be handled at controllable feeding rates on new parts feeder. Special design allows operation in explosive atmospheres. Vibratory principle combined with pneumatic operation insures gentle handling of parts.—**Syntron Co., Homer City, Pa.**

Ball Valve—New manual-type ball valve for water works, power plant, municipal and other industrial applications is designed for 150-lb.-per-sq.-in. working pressures. Body, rotor, and operating mechanism design ensure ease and tightness of closure, multiplication of leverage, and freedom from vibration.—**S. Morgan Smith Co., York, Pa.**

Belt Conveyor Carrier—Low-cost belt-conveyor carrier incorporates these features: (1) 4-in. dia. rollers have spun ends and turn on precision ball bearings, (2) die cast labyrinth seals protect bearings and provide permanent protection since they are noncorrosive, (3) grease fittings are provided for relubrication if desired, (4) carrier rolls are interchangeable and can be inserted or removed from brackets without tools.—**Stephens-Adamson Mfg. Co., Aurora, Ill.**

New Drafting Tape—Behr-Cat No. 114 drafting tape with controlled adhesive qualities holds tracing paper or cloth firmly on drafting or drawing boards, comes off roll cleanly, applies easily, and leaves no defacing or discoloring marks. It is available in 60-yd. rolls and 17 widths from ¼ to 3 in.—**Norton Behr-Manning Overseas Inc., Worcester, Mass.**

MANAGEMENT REPORT

Mobile banking permits customers in Mexico City to take care of their banking chores while hardly stirring from their siestas. The Banco Del Requeno Commercio Del had three truck bodies tailored to its specifications as an answer to the banking problem.

Because local transportation was difficult and small merchants had to close up shop if they wanted to visit their bank, mobile banking was introduced. Now these trucks visit market places, shopping centers, and small merchants' establishments.

Nine tested ways to lose your employees' respect and loyalty are guaranteed to hurt your firm's efficiency. (How many do you use?) (1) Nag—keep after your men. (2) Vacillate—change your mind, contradict orders. (3) Boss—you have the authority so be sure to use it. (4) Favor—play favorites; the others only work there. (5) Sneak—don't let anyone know what's going on. (6) Spoil—indulge your moods; snap one day and smile the next. (7) Threaten—be tough; you're the boss. (8) Belittle—prove you're a good fellow by criticizing company policy. (9) Overrule—after all, you are always right.—Chem Eng, Aug, p224

What makes suggestion plans work? Successful ones have these common features:

- **Adequate payment.** Average is 15% of the first-year saving from the idea, but some companies pay as high as 50%. Don't skimp. And follow up later and pay more if savings are greater than expected.
- **Prompt action.** Evaluate the idea quickly and inform the employee promptly. Enthusiasm and interest will not wait for slow acknowledgment.
- **Publicity.** Use your plant papers and bulletin boards to encourage suggestions.
- **Education.** Foremen cooperation is needed. So make it clear to them that good suggestions from their departments are to their credit.
- **Good administration.** Needed are a suggestion box for every 100 to 200 employees, an evaluation committee, and an organized handling procedure.—Am Mach, July 19, p144

If high foundry costs are bothering you, you'll be interested in a new foundry coke developed by Great Lakes Carbon Corp. It's called Densite coke because it is denser than ordinary foundry coke and has a more uniform structure. It is low in sulfur and ash content, and is made in a slot oven. Its action in the cupola is to increase cupola melting rate by 30%, increase metal fluidity, reduce refractory maintenance costs.

The "split dollar"—this is the latest innovation to attract U. S. companies seeking to sweeten executive compensation with insurance. The basic idea is: the company pays that part of the premium corresponding to the increase in the cash value; the insured pays only the balance.

Here is an example: Smith buys a $25,000 ordinary life policy. As there is no cash value the first year, he pays the whole $500 premium; but the second year he pays only $375, the company paying the cash value equivalent of $125, and so on. By the 10th year, the cash value increment equals the premium, and Smith's payments cease. But he is always covered by the policy's face value less the cash value belonging to his company.

"Split dollar" policies are being offered by some insurance firms, avoided by others. Among the latter's objections: The executive receives decreasing coverage; the employing company has the right to cancel the policy and the executive may not be able to afford to buy out its interest.—Business Wk, July 24, p64

If you have an industrial process that you would like to put under automatic control here's a five-point campaign plan:

- Make sure you really understand the process.
- Avoid wasted effort by deciding beforehand what you want to control, how you want to control it, and what equipment you really need.
- Take time to explain the new controls to operating personnel so that they understand what the controls do and how to use them.
- Follow up your installation with inspection to make certain the controls function properly.
- Integrate process design and control system at an engineering level. You cannot expect much benefit from merely hanging instruments on an existing process.—Control Eng, Sept, p44

Would you buy a competitor's product? In effect that is exactly what the De Vilbiss Co., Toledo, asks its employees. A display in the main plant and another in the offices put De Vilbiss products side by side with the products of its competitors.

Employees are encouraged to examine the competing products, decide which they would choose for value, appearance, and quality. Emphasis is on consumer products, but the industrial line is shown, too.

The idea conveyed is obvious. De Vilbiss tells its employees that if they want their company to be successful, it needs everybody working to make the product at a low price.—Factory, July, p99

NEW FREE CATALOGS

Filtration Equipment—New bulletin describes complete line of oil-filtering equipment. Information is given on purifiers, clarifiers, and Houdaille Purivac units.—Honan-Crane Corp., 26 Madison Ave., Lebanon, Ind.

Hydraulic Power Units—Quill-Type hydraulic power units for use with high production machines are covered in the Power Unit Bulletin.—Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich.

Cold-roll Forming—Book covers techniques and equipment needed for cold-roll forming for a variety of products. Advantages include savings in material and labor costs.—The Yoder Co., 5517 Walworth Ave., Cleveland 2, Ohio.

Hardfacing with Stellite—Have you got equipment with vital parts wearing from abrasion, corrosion, or heat? Booklet, "Hardfacing with Deloro Stellite," tells how to keep it running up to ten times longer.—Deloro Smelting Co. Ltd., Deloro, Ontario, Canada.

Excavator—Catalog contains complete information about the new DEMAG Universal-Excavator B 408 and its many interchangeable attachments.—DEMAG-Baggerfabrik GmbH., Dusseldorf-Benrath, Germany.

Current-limiting Reactors—The constructional and operational characteristics of self-shielding current-limiting reactors are described in booklet B-5918.—Westinghouse Electric Int'l. Corp., 40 Wall St., New York 5, N. Y.

Recording Controllers—Complete information on the new line of process instruments, including potentiometric and a-c bridge recorders and recording controllers, is given in bulletin GED-2100A.—International General Electric Co., 570 Lexington Ave., New York 22, N. Y.

Boring Mills—Detailed information about model ZK double-column vertical boring mills is given in bulletins No. 4014E and No. 4107E.—Schiess Aktiengesellschaft, Hansaallee 289, Dusseldorf-Oberkassel, Germany.

Ball Valves—Bulletin 159 describes the new line of manually-operated Smith ball valves.—S. Morgan Smith Co., York 8, Pa.

Pipe Insulation—Bulletin, "Aluminum Jacketed FOAMGLAS Pipe Insulation," points out the advantages of aluminum wrapped-at-the-factory cellular-glass insulation.—Pittsburg Corning Corp., One Gateway Center, Pittsburgh 22, Pa.

Sand-core Dryer—How to make better cores in less time at lower cost with a "Foundromatic" sand-core dryer is told in bulletin 15B7306C.—Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Adhesives—Leaflet No. 130 covers full-range of adhesives for use with Mylar polyester film.—Rubber & Asbestos Corp., Bloomfield, N. J.

Tubing—Folder TB 329 A lists the analyses and mechanical properties of 29 carbon, alloy and stainless tubing steels used in various types of heat exchangers and condensers.—Babcock & Wilcox Co., Beaver Falls, Pa.

Packaged Air Conditioners—Bulletin No. 77-5 provides construction details and complete specifications on new line of packaged air conditioners.—United States Air Conditioning Corp., Como Ave. S.E. at 33rd, Minneapolis 14, Minn.

Coil-winding Machines—Catalog No. 54, issued by the Geo. Stevens Mfg. Co., illustrates and completely describes machines for winding practically every kind of coil.—Scheel International, Inc., 4237 N. Lincoln Ave., Chicago, Ill.

Precision Cylindrical Grinders—Catalog CG-54 contains information on universal, plain, roll, centerless and special-purpose grinders. Brief specifications are included.—Landis Tool Co., Waynesboro, Pa.

Welded-steel Barges—All types of welded-steel barges for river and harbor use are described in bulletin No. 227.—Dravo Corp., Neville Island, Pittsburgh 25, Pa.

Branch Pipe Connections—Bulletin 533 deals with the problem of making branch connections to highly stressed transmission and distribution lines without interruption of fluid flow.—Taylor Forge & Pipe Works, P.O. Box 485, Chicago 90, Ill.

Diesel Fuel System—Descriptive folder contains complete information about the new Cummins PT fuel system.—Cummins Engine Co., Inc., Columbus, Ind.

Materials Handling—Job studies are available, covering operations of the versatile "Payloader" tractor-shovels.—Frank G. Hough Co., 923 Sunnyside Ave., Libertyville, Ill.

Liquid Cyclone—Bulletin 2502 describes in detail the physical appearance, applications, advantages, and action of this multiunit-type liquid cyclone, and cites actual operating data.—The Dorr Co., Barry Place, Stamford, Conn.

Industrial Scales—Forty-four new features are added to the traditional accuracy and dependability of Toledo scales. Complete range of types and capacities are described in catalog No. 2001.—Toledo Scale Co., Toledo 1, Ohio.

Electric Locomotives—Literature contains information and specifications on electric locomotives and rolling stock for industry, agriculture, mines, and transportation.—Hitachi Ltd., Marunouchi, Tokyo, Japan.

Pneumatic Controller—Catalog #53-11 describes the new Fischer & Porter field-mounted P-4 Pneumatrol pneumatic controller. Also included in catalog is a working sketch of this motion balance controller.—Fischer & Porter Co., 841 Jacksonville Rd., Hatboro, Pa.

Cranemobiles—Booklet, "All Lifts are Easier With a Cranemobile," contains information on design, construction, and operating characteristics that have made the Cranemobile so popular on all types of lifting and materials-handling jobs.—Bay City Shovels, Inc., Bay City, Mich.

Ground Resistance Testing—Latest technical data on measuring resistance of man-made grounds; theory, application and methods of soil resistivity measurement; and a brief discussion of geophysical prospecting by electrical methods are given in bulletin 1-1.—Associated Research Inc., 3758 W. Belmont Ave., Chicago 18, Ill.

Variable Speed Drives—Folder No. 2374 provides detailed information on the size 6 PIV variable speed drive. PIV drives are available in three types with many ratios and assemblies.—Link-Belt Co., 233 Broadway, New York 7, N. Y.

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Portugal's CABRIL DAM and POWER STATION

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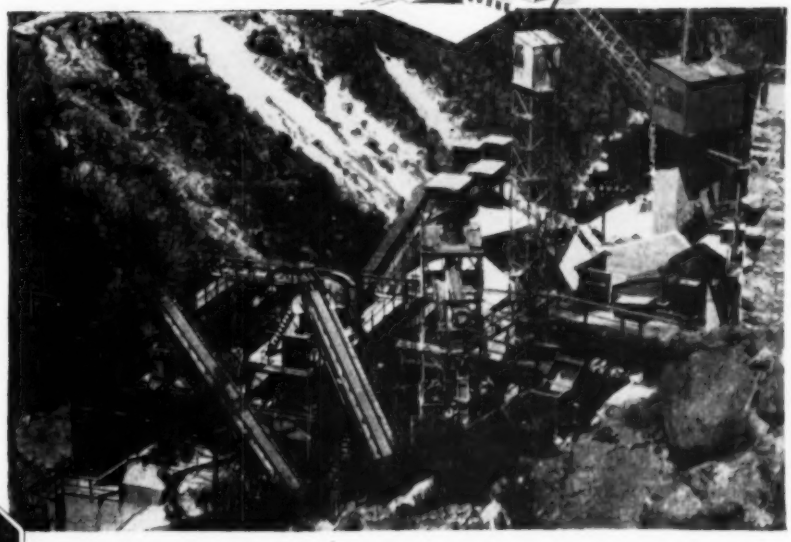

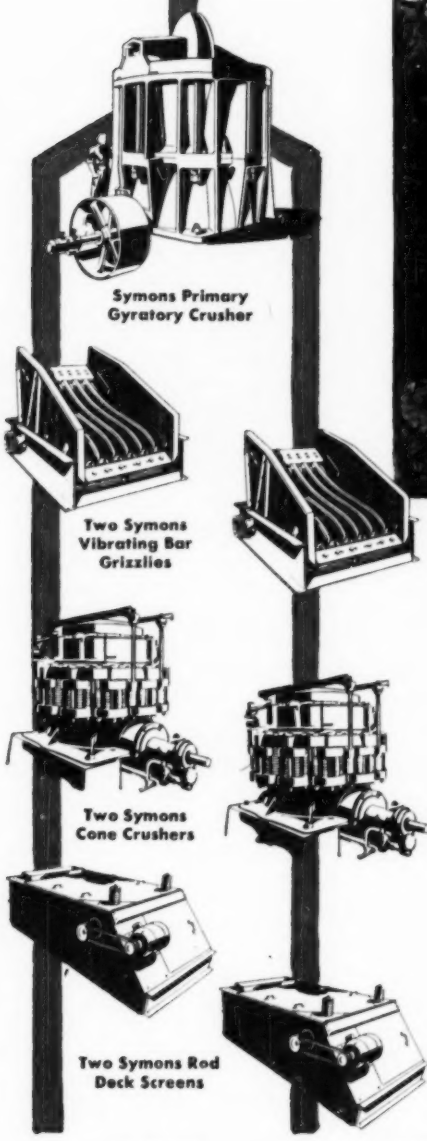
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Two Symons Vibrating Bar Grizzlies
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The Food Manufacturers

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The publication keeps readers up to date on new technical developments and practical know-how in all branches of the edible foods field, the major ones being baking, beverages, cereals, confectionery, dairy products, fruits and vegetables, and meat.

But FOOD ENGINEERING is not a compilation of information special to each of these branches individually. Rather it deals with operations and functions common to all. Each month, therefore, the magazine contains helpful articles and items about plant engineering, processing, packaging, sanitation, quality control, materials handling, maintenance, instruments, transportation, personnel and ingredients.

To handle this big editorial job, FOOD ENGINEERING has ten full-time, well-traveled, technical editors and two consulting editors. Two editors are in the Midwest and West Coast areas, and special correspondents are spotted in different sections of the country and Canada.

The staff keeps up with a field that is growing faster than the population, as per-capita consumption of convenient manufactured foods climbs steadily. It is a field

Frank K. Lawler
Editor, Food Engineering

that now includes more than 30,000 factories that spend about $1-billion annually on new plants and equipment in a postwar engineering revolution.

This engineering revolution is the industry's outstanding modern trend. In the years before World War II, technical emphasis was on chemistry and bacteriology. And while these sciences still are essential, engineering of processes into continuous, automatically controlled operations has asssumed major importance.

In fact, a new profession of food engineering has come into being, dedicated to higher efficiencies, lower costs, and better control of quality in manufactured foods. FOOD ENGINEERING watches and reports its achievements closely.

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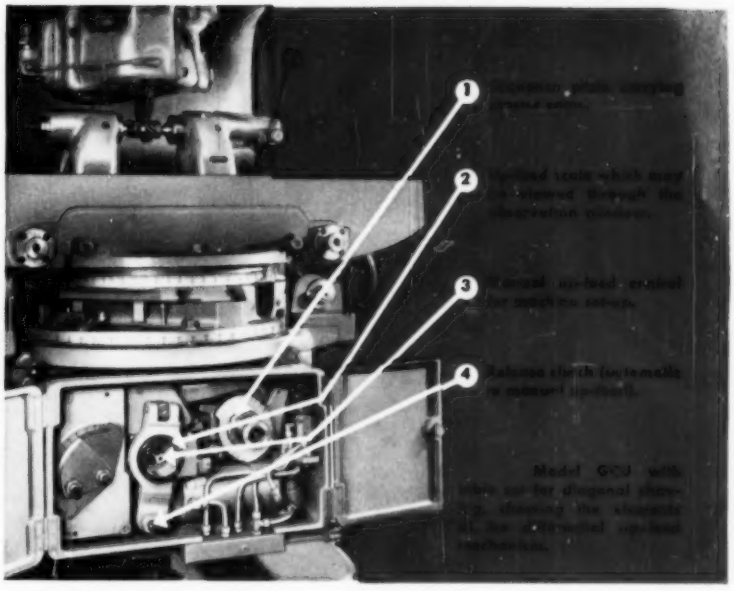

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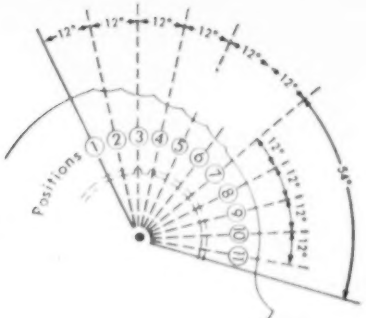

One of the two control cams carried by the feed unit sequence plate.

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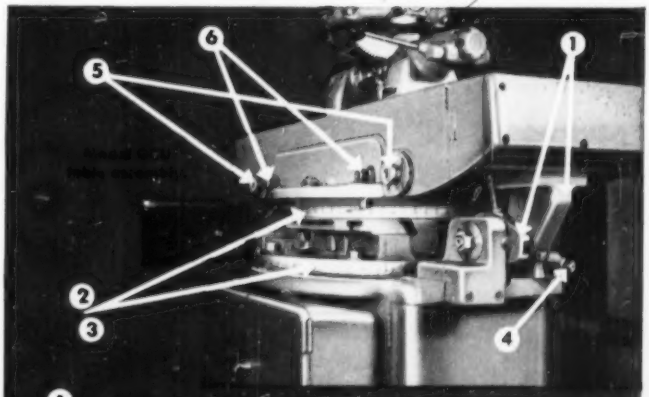

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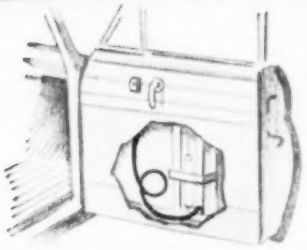

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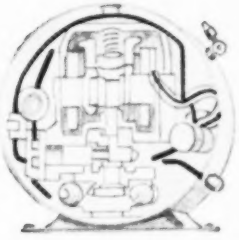

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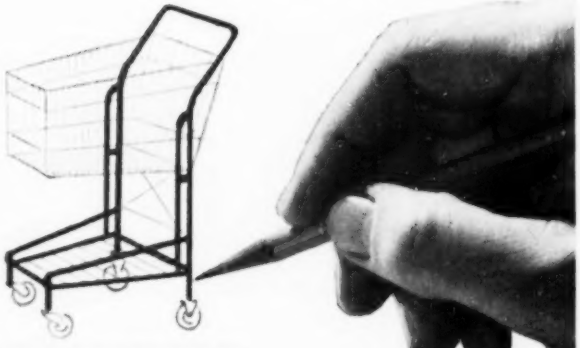

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